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Monticello Mill Tailings Site Environmental Report for Calendar Year 1992

May 1993

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Grand Junction Projects Office

RUST Geotech Inc.

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for Calendar Year 1992

May 1993

Prepared for

the U.S. Department of Energy

Grand Junction Projects Office

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Abbreviations and Acronyms

Alky	Alkalinity
BOD	Biochemical oxygen demand
CDT	Specific conductance
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COD	Chemical oxygen demand
DCG	Derived concentration guides
DO	Dissolved oxygen
DOE	U.S. Department of Energy
EDE	Effective Dose Equivalent
Eh	Oxidation-reduction potential
EML	Environmental Measurements Laboratory
EMSL	Environmental Measurement Systems Laboratory
EPA	U.S. Environmental Protection Agency
F-coliform	Fecal coliform
FFA	Federal Facilities Agreement
g/F	Grams per filter
GJPO	Grand Junction Projects Office
HQ	Headquarters
MED	Manhattan Engineer District
mg/L	Milligrams per liter
MMTS	Monticello Mill Tailings Site
MRAP	Monticello Remedial Action Project
mrem	Millirems
mrem/yr	Millirems per year
mV	Millivolts
NEPA	National Environmental Policy Act of 1969
NPL	National Priorities List
OU	Operable unit
PCB	Polychlorinated biphenyl
pCi/F	Picocuries per filter
pCi/L	Picocuries per liter
pg/mL	Picograms per milliliter
PM_{10}	Particulate matter less than or equal to 10 microns in diameter
ppm	Parts per million
QA	Quality assurance
QAPP	Quality Assurance Program Plan
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RI/FS—EA	Remedial Investigation/Feasibility Study—Environmental Assessment
scfm	Standard cubic feet per minute

TCL	Target Compound List
T-coliform	Total coliform
TDS	Total dissolved solids
TLD	Thermoluminescent dosimeter
TSS	Total suspended solids
μCi/mL	Microcuries per milliliter
μg/F	Micrograms per filter
μg/L	Micrograms per liter
μg/m^3	Micrograms per cubic meter
μg/mL	Micrograms per milliliter
μm	Microns
μmhos/cm	Micromhos per centimeter
UMTRCA	Uranium Mill Tailings Radiation Control Act
UPDES	Utah Pollution Discharge Elimination System
VCA	Vanadium Corporation of America

Executive Summary

This report contains information pertaining to environmental activities conducted during calendar year 1992 at and near the inactive uranium millsite in Monticello, Utah. It has been prepared in accordance with the requirements of U.S. Department of Energy (DOE) Order 5400.1 and supplemental information received from DOE Headquarters. Monitoring and report preparation were performed by RUST Geotech Inc., the DOE contractor for the Grand Junction Projects Office facility in Grand Junction, Colorado.

Environmental activities conducted at the Monticello Mill Tailings Site (MMTS) during 1992 included those associated with remedial action and compliance monitoring. Compliance monitoring consisted of both radiological and nonradiological monitoring of air, surface water, and ground water.

Remedial action activities conducted were primarily those concerned with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements. The *Final Remedial Design Work Plan* (Chem-Nuclear Geotech, Inc. 1992a) for the design of the remedial action at the millsite was submitted to the U.S. Environmental Protection Agency (EPA) and state of Utah in January. Designs for the individual phases of remedial action also were prepared in 1992 according to requirements identified in the MMTS Record of Decision (DOE 1990). In November, the Operable Unit III (surface and ground water) remedial investigation was begun. Monitoring wells were installed upgradient of the millsite to assess background water-quality conditions, and downgradient wells were installed east of the millsite to assess the extent of contaminant migration.

Radiological and nonradiological air monitoring at the MMTS included measurements of atmospheric radon, particulate matter, and gamma radiation. Atmospheric radon concentration was measured at eight locations off the millsite and two locations on the millsite boundary. During 1992, two of the off-site and both of the site-boundary locations had radon concentrations exceeding the EPA standard for atmospheric radon. These results are consistent with analytical results from previous years. The effective dose equivalent (EDE) to the maximally exposed individual near the millsite was calculated as 52 millirems per year (mrem/yr), exclusive of background. This dose, which included radon, air particulate, and gamma source terms, was below the DOE standard of 100 mrem/yr above background.

Air particulate monitoring for radiological and nonradiological constituents was conducted at one location on and two locations off the millsite with high-volume particulate samplers. The maximum airborne concentrations of radium-226, thorium-230, and total uranium at all locations were several orders of magnitude below the regulatory limits specified by DOE Order 5400.5. In addition, the EPA standards of 50 micrograms per cubic meter ($\mu g/m^3$) (annual arithmetic mean) and 150 $\mu g/m^3$ (24-hour average) for acceptable levels of particulate matter smaller than or equal to 10 microns were not exceeded at any location.

Gamma radiation was monitored at eight locations on and five locations off the millsite. Four of the on-site monitoring locations yielded gamma radiation levels above the DOE standard of 100 mrem/yr (above background), whereas all off-site locations yielded levels well below the standard.

Surface water monitoring included water quality measurements within Montezuma Creek. This perennial creek, which flows through the millsite property, has frequently contained contaminants at levels exceeding state of Utah surface-water standards as far as 3 to 5 kilometers (2 to 3 miles) downstream of the property. Some contamination in the creek results from discharge of the contaminated alluvial aquifer beneath the millsite. During 1992, maximum levels of selenium, gross alpha, gross beta, total dissolved solids, and iron exceeded their respective state standards in one or more samples collected from upstream, on-site, and downstream (with respect to the millsite) locations. Montezuma Creek is used for both irrigation and livestock watering in the vicinity of the millsite.

Ground-water monitoring was conducted for two aquifers underlying the millsite — a shallow, alluvial aquifer and a deeper, Burro Canyon aquifer. The shallow aquifer is contaminated by leached products of uranium mill tailings. During 1992, Uranium Mill Tailings Radiation Control Act and state of Utah ground-water standards for arsenic, barium, nitrate, chromium, lead, selenium, molybdenum, uranium-234 and -238, gross alpha particle activity, and radium-226 and -228 were exceeded in one or more alluvial wells. One sample collected from a Burro Canyon well on the millsite contained uranium concentrations and gross alpha particle activities above their respective federal/state standards. This well will continue to be sampled to determine if the presence of these constituents was anomalous or if the measurements represented contamination in the aquifer. All other samples from Burro Canyon wells contained constituent concentrations below federal/state standards.

Introduction

The Monticello Mill Tailings Site (MMTS), located in San Juan County, Utah, comprises several tracts of land, including the Monticello millsite, the South Site (Figure 1), and 25 peripheral properties adjacent to the millsite. The U.S. Department of Energy (DOE) owns the former two tracts and several of the peripheral properties. Other individuals or entities own the remaining peripheral properties. Uranium mill tailings and by-product materials produced during early mill operations contaminate the millsite and peripheral properties. Once these tailings and contaminated materials are removed under remedial action, they will be permanently stored in a repository located on the South Site.

The millsite itself is a 31.6-hectare (78-acre) tract of land located within the city limits of Monticello. No residences are located within the millsite boundary, but residences are adjacent to the north, south, and east edges of the millsite. In 1990, the population of Monticello was 1,838.

Geographically, the millsite is located in the valley of Montezuma Creek, a perennial stream that flows from west to east through the center of the millsite. Alluvium and sedimentary rocks underlie the property. The surrounding land is used for residences, farming/ranching, and recreation (e.g., camping, hiking, and hunting).

The Vanadium Corporation of America (VCA) constructed the mill in 1942 with funds from the Defense Plant Corporation. Initially, the VCA processed vanadium, but from 1943 to 1944, the VCA processed a uranium-vanadium sludge for the Manhattan Engineer District (MED). After milling operations by the VCA ceased in 1944, the mill was leased from 1945 to 1946 to continue the production of uranium-vanadium sludge for MED. The U.S. Atomic Energy Commission purchased the millsite in 1948. Uranium milling began in September 1949 and continued to January 1960 when the mill was permanently closed. At that time, part of the land was transferred to the Bureau of Land Management. This land was returned to the DOE in 1990, and the DOE now owns and manages this returned parcel along with the remainder of the millsite.

The mill area covers approximately 4 hectares (10 acres), and the tailings impoundment area covers 27.6 hectares (68 acres). None of the original mill buildings remain (except for a maintenance shed), but contaminated foundations and scrap materials are buried on site. The tailings impoundment area contains an estimated 1,019,000 cubic meters (1,350,000 cubic yards) of tailings and contaminated soil in four discrete piles (Figure 2). An additional 204,000 cubic meters (270,000 cubic yards) of contaminated material is present on adjacent open lands (Marutzky and others 1985).

Prior to 1955, the environmental problems receiving attention at the millsite arose from the salt roast procedure used to enhance vanadium recovery. Along with chlorine and hydrogen chloride gas, an average of nearly 1,182 kilograms (2,600 pounds) of dust containing 0.363 percent uranium oxide and 1.52 percent vanadium pentoxide escaped daily through the roaster stack (Allen and Klemenic 1954). The mill operator verified

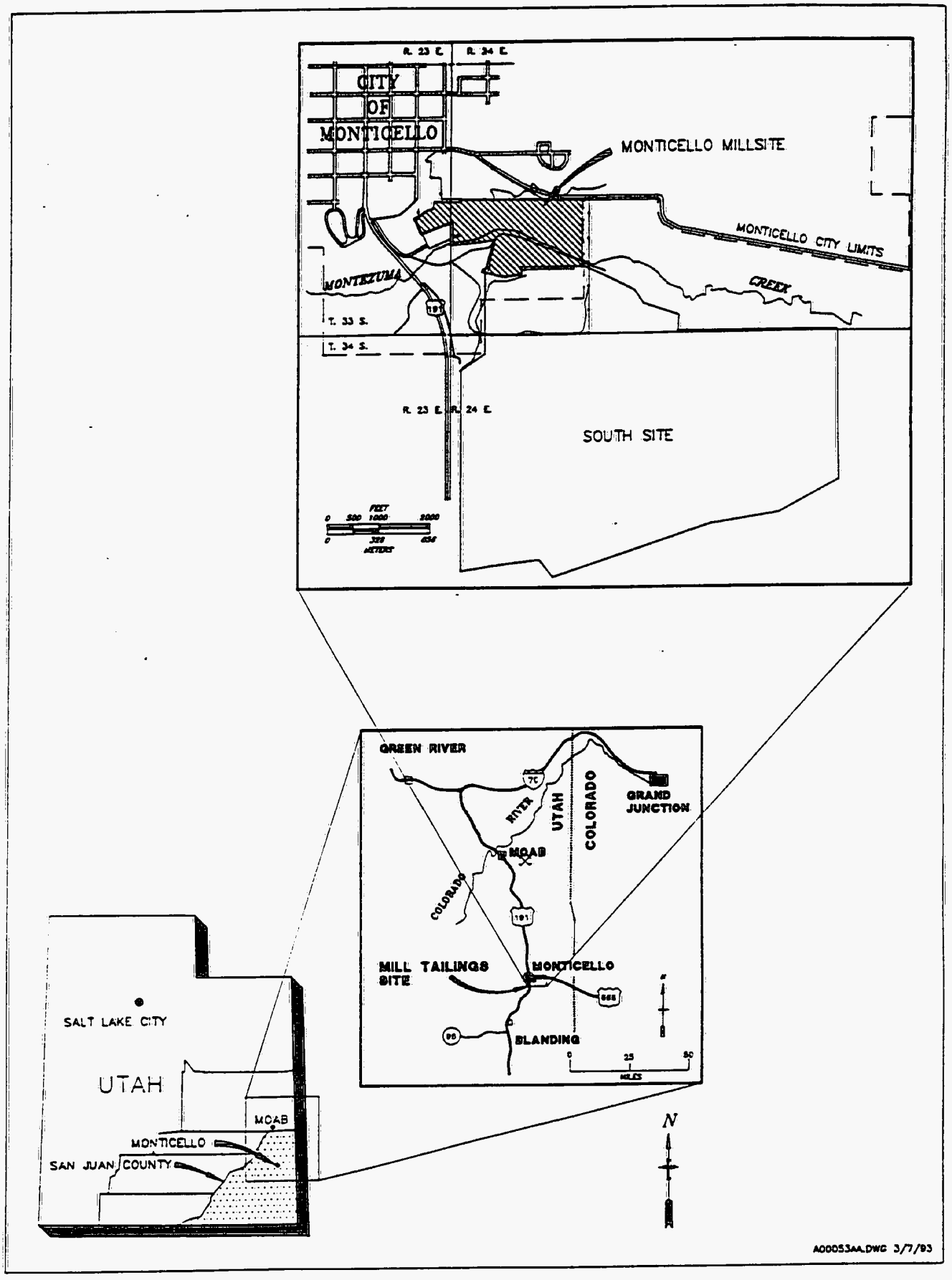

Figure 1. Site Location Map of the MMTS

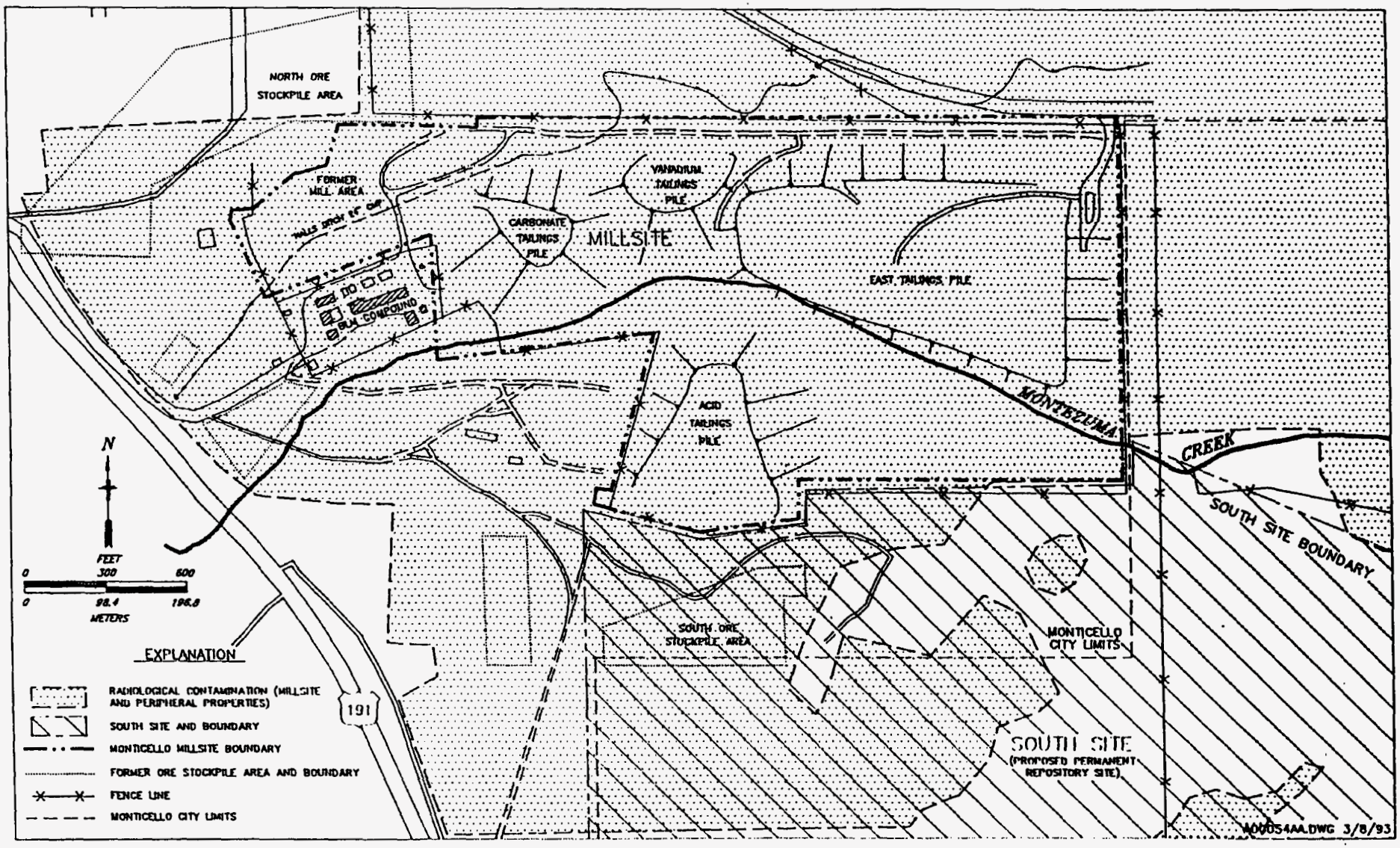

Figure 2. Radiological Contamination Map of the Monticello Millsite

corrosion of wire fences, clotheslines, and galvanized roofs in response to complaints from local residents.

Liquid effluent from the salt roast/carbonate leach plant (which contained substantial concentrations of chloride, sulfate, carbonate, bicarbonate, sodium, and other dissolved species) was released into Montezuma Creek. Release of radium-226 was of special concern; soluble radium activity in Montezuma Creek was measured at 160 picocuries per liter (pCi/L). It was also recognized that the suspended solids contained considerable radium activity and that dry tailings were being washed into the creek (Whitman and Beverly 1958).

During milling operations, the tailings were usually moist and erosion by wind was minimal. Within a year after shutdown, however, the tailings dams and surfaces of the tailings piles dried out, and tailings sand began to migrate as dunes. Erosion by water also became a problem. Several cleanup activities conducted by the U.S. Atomic Energy Commission after mill closure substantially stabilized the area but did not eliminate water contamination. Extensive studies (Lennemann 1956, George 1958, George 1959, Whitman and Beverly 1958, UNC Geotech 1990) conducted at the millsite demonstrate that all four tailings piles contribute to the contamination of ground water and surface water, both on and off site. Currently, the contaminated ground water is not used for any purpose, and Montezuma Creek water is used for livestock watering and irrigation downstream of the millsite.

Responsibility for the administration, maintenance, and environmental monitoring of the inactive millsite and tailings area resides with the DOE Grand Junction Projects Office (GJPO). RUST Geotech Inc. (Geotech), the prime contractor for the DOE-GJPO, performs the environmental monitoring at the millsite. The site was accepted into the Surplus Facilities Management Program in 1980. Under this program, the chief objective was to minimize potential health hazards to the public and environment that were associated with the tailings at the millsite. To provide a basis for making decisions regarding the remediation of the site, an environmental and engineering characterization was completed and documented in the *Monticello Remedial Action Project Site Analysis Report* (Abramiuk and others 1984). In addition, the *Final Remedial Investigation/Feasibility Study—Environmental Assessment for the Monticello, Utah, Uranium Mill Tailings Site* (RI/FS—EA) (UNC Geotech 1990) report was finalized in March 1990, and the *Monticello Mill Tailings Site—Declaration for the Record of Decision and Record of Decision Summary* (DOE 1990) was approved by the U.S. Environmental Protection Agency (EPA), state of Utah, and DOE in September 1990.

The Record of Decision (DOE 1990) describes selected remedial actions for two of the three operable units (OUs) encompassed by the MMTS and summarizes the extent of contamination in the third OU. OU I addresses excavation of uranium mill tailings and other by-product materials from the millsite and their containment in a permanent repository on the South Site. Excavation of radioactively contaminated soils and by-product materials from properties peripheral to the millsite is addressed by OU II. Collectively, the remedial actions for OU I and OU II are referred to as the Monticello

Remedial Action Project (MRAP). Remedial action for OU III, which addresses ground water and surface water on the millsite and downgradient peripheral properties, will be selected in a separate Record of Decision after completion of a focused RI/FS.

This Site Environmental Report presents information pertaining to environmental activities conducted during calendar year 1992 at the MMTS. It is organized into eight major sections: Compliance Summary—January 1, 1992, through April 1, 1993; Environmental Program Information; Environmental Radiological Program Information; Environmental Nonradiological Program Information; Ground-Water Protection Program; Quality Assurance; Appendix A, Monitoring Data; and Appendix B, Time-Concentration Graphs.

The Compliance Summary section summarizes GJPO compliance with major federal and state environmental requirements at the MMTS for the period January 1, 1992, through April 1, 1993.

The Environmental Program Information section includes 1) a description of the contamination present at the MMTS, 2) a summary of air and surface-water monitoring performed on and near the MMTS, including a discussion of how monitoring results compare with applicable standards, 3) a list of environmental permits issued to the DOE-GJPO by federal and state regulatory agencies and a list of environmental documents completed in 1992 pertaining to MMTS activities, and 4) a summary of significant environmental activities occurring at the MMTS.

The third and fourth sections, Environmental Radiological and Environmental Nonradiological Program Information, summarize the results of the radiological and nonradiological monitoring programs, respectively, conducted on and near the MMTS.

The Ground-Water Protection Program section describes the hydrogeology at the millsite and the program conducted to monitor ground water. Analytical results of ground-water monitoring are compared with federal and state standards.

The Quality Assurance section summarizes the measures taken to ensure the quality of monitoring data collected on and near the MMTS. This section also includes results of the participation of the Geotech Analytical Chemistry Laboratory in interlaboratory cross-check programs.

Appendix A comprises analytical data collected during 1992 and is organized according to medium and date sampled. Analytical data include radon, air particulates, direct gamma radiation, surface water, and ground water.

In Appendix B, data from selected media and locations are presented graphically to show changes in analyte concentrations over time. Also included in the graphs is a comparison between collected data and the applicable state or federal standard.

This report also includes an Abbreviations and Acronyms section, which follows the Contents page of the report; a References section, which follows the Quality Assurance

section; and a Distribution List section, which lists persons and organizations who receive copies of this report.

Compliance Summary—January 1, 1992, through April 1, 1993

Compliance Status

The compliance status for each of the major federal and state environmental statutes applicable to the MMTS is as follows:

Comprehensive Environmental Response, Compensation, and Liability Act

The MMTS was listed on the National Priorities List (NPL) on November 21, 1989. Environmental restoration of the MMTS is prescribed in a Federal Facility Agreement (FFA), signed in December 1988, among the DOE-GJPO, EPA, and state of Utah. DOE-GJPO activities associated with the MMTS have been conducted in full compliance with the FFA. Remedial actions at the MMTS will include remediation of uranium mill tailings and contaminated ground and surface waters.

The *Final Remedial Design Work Plan* (Chem-Nuclear Geotech, Inc. 1992a) for the design of the remedial action for the millsite was submitted to the EPA and state of Utah in January 1992. This document was finalized via the FFA review process in February 1992.

Designs for several phases of MRAP were prepared in accordance with the applicable or relevant and appropriate requirements identified in the MMTS Record of Decision (DOE 1990). The following design documents were submitted to the DOE-Headquarters (DOE-HQ) and/or the EPA and state of Utah for review during 1992 and the first quarter of 1993:

- Millsite Site Preparation Final Design
- Millsite Pre-Excavation Intermediate Design
- Millsite Pre-Excavation Pre-Final Design
- Remedial Action Designs for Peripheral Properties MP-00178-VL, Phase I; MP-00198-VL; MP-00963-OT, Phase I; MP-00178-RS, Phase II; MP-00963-OT, Phase II; MP-00180-CS; MP-00845-VL; MP-00948-VL; and MP-00949-RS.

The following OU III surface- and ground-water RI/FS documents were finalized during 1992:

- Work Plan
- Field Sampling Plan
- Quality Assurance Project Plan
- Health and Safety Plan

The *Draft Monticello Surface- and Ground-Water Remedial Action Project CERCLA Management Plan* (Chem-Nuclear Geotech, Inc. 1991a), required for the investigation and remediation of OU III, was submitted to the EPA and state of Utah in November 1992. The *Draft Monticello Mill Tailings Site, Operable Unit III, Monticello Surface- and Ground-Water Remedial Action Project, Project Management Plan* (Chem-Nuclear Geotech, Inc. 1993) was submitted to DOE-HQ for review in January 1993.

Various activities, including the construction of OU I Phase I (Millsite Site Preparation), well abandonment, installation of OU III monitoring wells, etc., occurred during 1992 and the first quarter of 1993. These activities represent "substantial and continuous physical on-site remedial action," as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 120. Phase I construction is scheduled to be completed in the fourth quarter of 1993.

The Information Repositories for the Monticello Mill Tailings NPL Site and the Monticello Vicinity Properties NPL Site were periodically updated in 1992 and during the first quarter of 1993, as required by CERCLA. Additionally, an Information Repository and an Administrative Record were created for OU III during January 1993.

Uranium Mill Tailings Radiation Control Act

The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 authorized remedial action at certain inactive uranium milling sites that were not owned by the federal government. Because the MMTS is owned by the DOE, this is not an applicable requirement. However, UMTRCA is considered to be a relevant and appropriate requirement for remedial activities associated with this site. Cleanup of lands and buildings having radioactive contamination is conducted to the standards specified in 40 CFR 192 and UMTRCA.

Clean Air Act

Air quality at the millsite is monitored to verify conformance with ambient air quality standards. As determined in the RI\FS—EA (UNC Geotech 1990), the Clean Air Act is an applicable requirement for remedial action at the millsite. The millsite is specifically identified under and subject to the provisions of 40 CFR 61, Subpart Q, which defines a radon-flux standard (20 pCi/square meter/second) for DOE facilities. This flux standard is exceeded at the tailings piles on the millsite. One objective of the planned environmental restoration will be to remove the contaminant source (i.e., tailings piles) so that the radon-flux standard is no longer exceeded.

A proposed compliance position for Subpart Q requirements addressing the Memorandum of Understanding negotiated between the DOE-GJPO and EPA was submitted to the EPA and state of Utah for review in December 1991. Review comments were received from the EPA and state of Utah in January 1992. The revised compliance position paper was resubmitted during the spring of 1992; no further action was determined necessary.

Fugitive dust control requirements, as established by Section R446-1-4.5 of the Utah Air Conservation Regulations, are applicable to the MMTS. Opacity measurements are taken by a certified opacity observer to ensure that dust emissions do not exceed the permissible levels. Measures taken to comply with these requirements included the application of water spray to all construction areas and haul roads and the cessation of construction operations when wind speeds exceeded 40 miles per hour.

Clean Water Act/Executive Order 11990, "Protection of Wetlands"

As determined in the RI/FS—EA (UNC Geotech 1990), the Clean Water Act is a specified applicable requirement for remedial action at the MMTS. Waters affected by the millsite are routinely monitored with respect to state of Utah water-quality standards, which were promulgated by the Clean Water Act. Both surface water and ground water at the millsite are contaminated by leachate from uranium mill tailings and contain radiological levels and inorganic contaminant concentrations that exceed applicable standards (see discussion in Surface Water subsection of the Environmental Program Information chapter). One objective of the planned environmental restoration will be to remove the source of contamination, which will improve water quality on the site. The remedial action for surface water and ground water will be selected through the CERCLA process.

Through consultations with the Utah Division of Water Quality, Department of Environmental Quality, the DOE-GJPO has begun the process of preparing a Utah Pollution Discharge Elimination System (UPDES) permit application for the water treatment plant planned for construction in 1994 adjacent to the millsite. Specific water-quality threshold limits are being determined for the discharge from this plant into Montezuma Creek. DOE has received copies of EPA Application Form 1 ("General Information") and EPA Application Form 2D ("New Sources and New Dischargers: Application for Permit to Discharge Process Wastewater"). So that background levels of parameters required to be measured in Application Form 2D could be determined, Montezuma Creek was sampled at four locations during November 1992 and March 1993 (results are discussed in Surface Water subsection of the Environmental Program Information chapter).

Discharges of storm-water runoff also are regulated by the UPDES program. Because remedial construction activities at the millsite and several of the peripheral properties will result in land disturbances that exceed 5 acres, storm-water pollution prevention and erosional control measures must be implemented at each individual site in accordance with the UPDES regulations. To demonstrate that the intent of these regulations is being followed, the DOE-GJPO has identified and incorporated specific control measures, outlined in the *UPDES General Permit for Storm-Water Discharges From Construction Activities That Are Classified As "Associated With Industrial Activity,"* as integral elements of the remedial design for each property. Actual permits will not be procured because these properties are part of a CERCLA site. The DOE-GJPO currently is seeking concurrence from the state of Utah and EPA that this management approach satisfies the applicable requirements.

Planned construction activities in Montezuma Creek require that the intent of Utah's Administrative Rules for Stream Channel Alterations be met. A Stream Channel Alteration Permit application was submitted to the Utah State Engineer. This application addresses the placement of a half-pipe structure into the creek that will minimize recharge of the alluvial aquifer under the millsite. At the completion of remedial action, Montezuma Creek will be restored to its natural stream channel in accordance with all applicable or relevant and appropriate requirements.

Because MMTS remedial actions will disturb wetlands, a permit application was submitted in March 1992 to the U.S. Army Corps of Engineers in accordance with Section 404 of the Clean Water Act and Executive Order 11990, "Protection of Wetlands." Wetlands will be reestablished as part of the millsite reclamation design and in accordance with applicable or relevant and appropriate requirements.

Executive Order 11988, "Floodplain Management"

Because the U.S. Army Corps of Engineers determined in 1990 that the MMTS is located within the floodplain of Montezuma Creek, Executive Order 11988, "Floodplain Management," is a potential applicable requirement for remedial action. The order requires DOE to evaluate remedial actions so that adverse impacts associated with direct and indirect development of the floodplain will be avoided.

State of Utah Ground-Water Quality Protection Regulations

Tailings excavated from the MMTS will be placed in an on-site repository. The design of this repository will address measures to be taken to protect the existing and probable future uses of ground water at the disposal site. Discharge from the repository will be controlled to the extent necessary to ensure that contaminant levels at downgradient monitoring wells do not exceed established protection levels.

Safe Drinking Water Act

The provisions of the Safe Drinking Water Act are potentially relevant to the MMTS because of the presence of the Burro Canyon Formation, which is located beneath the millsite and is used as a public water supply. Should contamination associated with millsite activities be identified in the Burro Canyon aquifer, maximum contaminant levels may be used to establish cleanup standards.

Resource Conservation and Recovery Act

No Resource Conservation and Recovery Act (RCRA)-listed or characteristic hazardous wastes have been managed at the MMTS. The Utah Hazardous Waste Management Regulations may be considered to be an applicable or relevant and appropriate requirement if hazardous waste is encountered prior to or during remedial activities.

National Environmental Policy Act

The RI/FS—EA (UNC Geotech 1990) was completed for MMTS activities and approved by the EPA and state of Utah in January 1990. A Finding of No Significant Impact for remediation of the MMTS was issued in February 1990. The *Draft Environmental Assessment of Additional Lands Proposed for Acquisition for the Monticello, Utah, Uranium Mill Tailings Repository* (Chem-Nuclear Geotech, Inc. 1992b), for the acquisition of 800 acres of land adjacent to the millsite, was submitted to the DOE-HQ for review and approval in February 1992. In a February 1993 letter from the DOE-HQ Office of Environmental Restoration and Waste Management, it was determined that the EA was not required for the planned land acquisition; therefore, it was retracted from the review and approval process. No other National Environmental Policy Act (NEPA) documentation was prepared in 1992 or during the first quarter of 1993. Ongoing activities at the MMTS are evaluated for compliance with NEPA.

Endangered Species Act

The Endangered Species Act requires DOE to ensure that any actions authorized, funded, or carried out at the MMTS will not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat required for the continued existence of that species. Although no currently designated threatened or endangered species have been identified at or in the immediate vicinity of the MMTS, activities associated with the site have been and will be conducted in accordance with this applicable requirement.

National Historic Preservation Act

The National Historic Preservation Act requires DOE to take into account the effect of any federally assisted undertaking or licensing on a structure or object that is included on or eligible for the National Register of Historic Places. Activities associated with the MMTS have been and will be conducted in accordance with this applicable requirement.

Archaeological and Historical Preservation Act

The Archaeological and Historical Preservation Act establishes procedures to provide for the preservation of historical and archaeological resources that may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. Archaeological surveys were conducted in 1992 on land that could be affected by activities associated with remedial action. Archeological Site 42, which lies within the proposed haul road corridor, was test-excavated during September 1992 to determine appropriate mitigation measures. Activities associated with the MMTS have been and will be conducted in accordance with this applicable requirement.

Current Issues and Actions

The final work plan for the characterization of nonradiological wastes on the former Bureau of Land Management's compound was submitted to the EPA and state of Utah in March 1993.

Alternatives for the design of the repository are being evaluated to determine the most cost-effective approach for protection of ground-water quality. The current design is focused on the construction of the repository on the South Site and use of a liner system to control discharge. If alternative disposal locations or significantly different design concepts are selected, the scheduled completion date of the remedial action will be modified to reflect the selected alternative.

Summary of Facility Permits

As specified at 40 CFR 300.400, federal, state, or local permits are not required for on-site response actions conducted pursuant to CERCLA. Although this language reduces the administrative burdens associated with permits, the intent of all applicable or relevant and appropriate requirements must be met. Permit applications are sometimes submitted as a tool for formalizing communications with regulatory agencies on CERCLA sites. As discussed in the previous section, some permit applications (i.e., for ground-water monitor well installations, discharges of processed wastewater [UPDES], stream channel alterations, and wetlands disturbances) have or may be submitted for MMTS activities. However, to date, no permits have been issued for MMTS activities.

Environmental Program Information

Sources of Contamination

Uranium mill tailings are the principal waste type at the MMTS; residual uranium ore in old ore stockpile areas at the millsite is an additional, although minor, waste type. According to Albrethsen and McGinley (1982), 819,291 metric tons (903,298 short tons) of uranium ore was processed at the Monticello mill between 1948 and 1960 to yield approximately 2,077 metric tons (2,290 short tons) of uranium oxide and 1,061 metric tons (1,170 short tons) of vanadium pentoxide. Most of the original constituents of the ore, as well as the chemicals added during the milling process, reside in the tailings. Historically, environmental concern focused on the radiological hazards associated with the tailings and ore, but later, it was recognized that a number of trace elements also occurred at elevated concentrations in uranium ore (Dreesen and others 1982). These trace elements were not recovered during milling operations but were passed through the circuit to the tailings piles.

The tailings generated by the milling operations are contained in four piles referred to, in order of their construction, as the Carbonate, Vanadium, Acid, and the East tailings piles (Figure 2). The Carbonate and Vanadium tailings piles were formed during the period from 1949 to 1955 when the mill was recovering vanadium as a by-product. The process used for the recovery was a salt roast/carbonate leach process. Use of the Acid tailings pile commenced about 1955. This pile received tailings from the acid leach resin-in-pulp process and a carbonate leach circuit. The East tailings pile operated from 1956 until mill shutdown in 1960 and received tailings from the acid leach circuit and the high-temperature, carbonate leach resin-in-pulp circuit. Windblown tailings from these piles contaminated the peripheral properties comprised by the MMTS.

Photographs taken during the operation of the millsite indicate that earthen berms were initially used to impound the tailings. As the impoundment filled, sandy tailings were apparently used as berm material to maintain the ponds. After closure of the mill, the piles were regraded and stabilized by covering them with pit-run gravel and top soil and seeding a vegetative cover. Materials from all four tailings piles provide a contaminant source for ground-water leachate and atmospheric releases. A critical pathway analysis, in which source terms and pathways of radiation exposure were determined, was performed and documented in the RI/FS—EA (UNC Geotech 1990).

Environmental Monitoring Summary

Air

Atmospheric Radon

The environmental radon monitoring program was initiated at the MMTS in 1984 with the installation of 19 sample locations. After a year of baseline data was collected, the

sampling network was reduced to eight representative locations. In 1992, radon concentration was measured at these locations (Figure 3) with Landauer Radtrak® alpha-sensitive detectors. The detectors were exposed in duplicate 1 meter above the ground surface and were analyzed quarterly (3-month exposure).

The EPA standard (40 CFR 192) for atmospheric radon concentration (at the edge of an inactive uranium mill tailings pile) of 0.50 pCi/L above background has been adopted for the MMTS. From a natural background concentration of 0.41 pCi/L (UNC Geotech 1990), the site-specific standard of 0.91 pCi/L was calculated. As shown in Table 1, the atmospheric radon concentrations measured during 1992 exceeded the EPA standard at both locations along the millsite boundary and at one location (RN-M-04) off the millsite. Concentrations at the remaining off-site locations were below the standard. These values are consistent with previous years' analytical results. Quarterly data collected at each location are listed in Tables A-1 through A-4 in Appendix A.

Table 1. Comparison of Average Annual Radon Concentrations At and Near the MMTS with the EPA Standard

Sampling Location	Radon Concentration	
	Annual Average (pCi/L)[a]	EPA Standard (Including background) (pCi/L)
On-Site		
RN-M-06	2.59	0.91
RN-M-07	1.28	0.91
Off-Site		
RN-M-04	1.51	0.91
RN-M-10	0.51	0.91
RN-M-11	0.21	0.91
RN-M-13	0.44	0.91
RN-M-14	0.20	0.91
RN-M-15	0.62	0.91

[a] 1 pCi/L = 3.7×10^{-2} becquerels/L.

Two Pylon AB-5 real-time radon monitors were installed adjacent to the millsite (Figure 3) in August 1992 to determine the effect of increased construction activity at the millsite on ambient radon concentrations. The monitors were placed in downwind, residential locations where the highest concentrations of radon were expected. Results of the monitoring indicate that radon concentrations (Table 2) at Station 1 consistently exceeded the EPA standard (with the exception of December's results), whereas

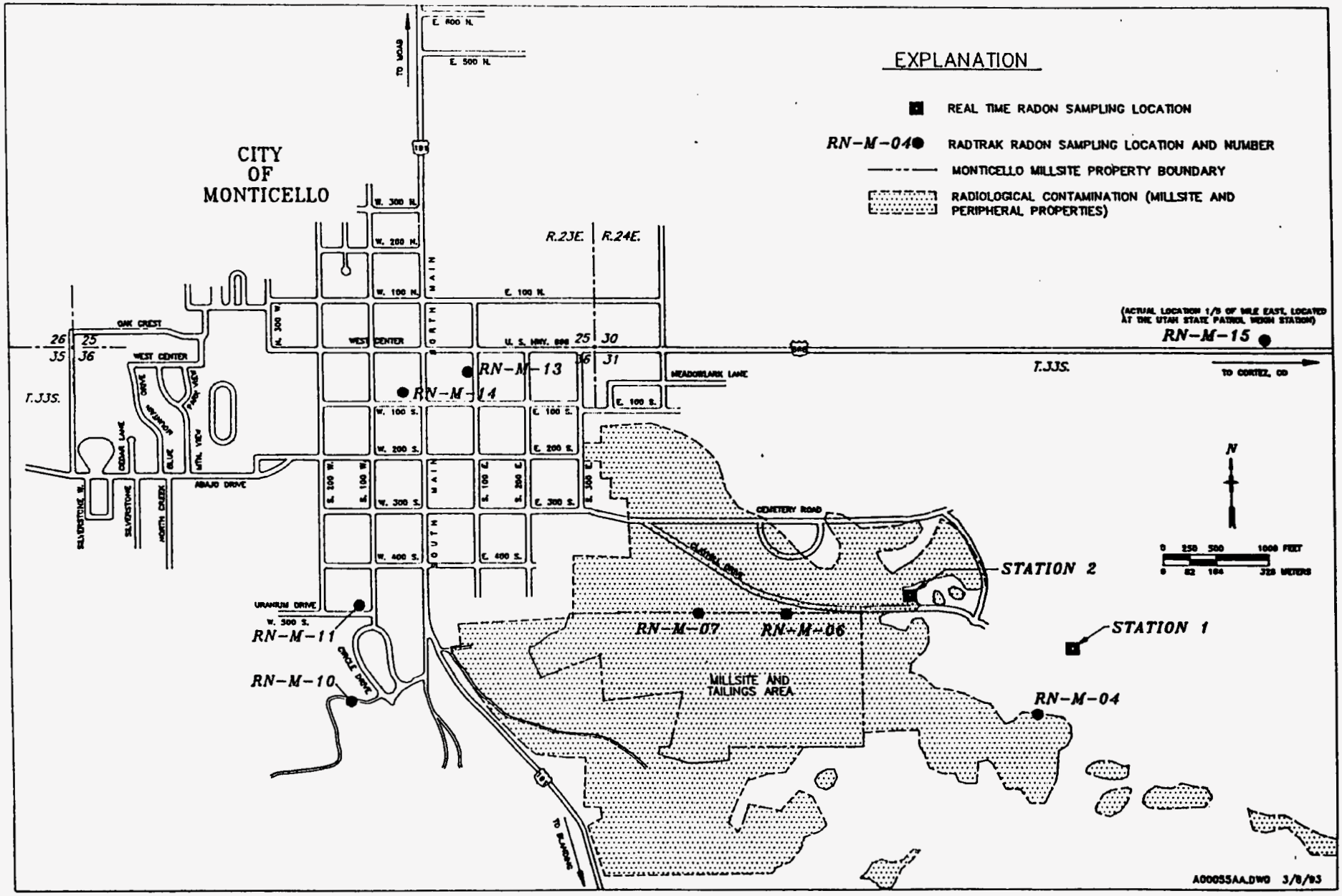

Figure 3. Atmospheric Radon Monitoring Locations At and Near the MMTS

Table 2. Comparison of Average Monthly Real-Time Radon Monitoring Results with EPA and DOE Standards

Sampling Period	Sampling Locations		EPA Standard (40 CFR 192)	DOE DCG (DOE Order 5400.5)
	Station 1 (pCi/L)[a]	Station 2 (pCi/L)[a]		
August	0.9	0.7	0.91	3.41
September	1.0	0.8	0.91	3.41
October	1.1	0.8	0.91	3.41
November	1.1	0.7	0.91	3.41
December	0.7	0.6	0.91	3.41

[a]Values listed include the background value of 0.41 pCi/L; 1 pCi/L = 3.7×10^{-2} becquerels/L.

concentrations at Station 2 consistently were below the EPA standard. Table 2 also shows that radon concentrations at both sites were below the DOE derived concentration guideline (DCG) established for radon. A DCG represents the concentration that would cause a member of the public to receive a dose of 100 millirems per year (mrem/yr) from inhalation of radon.

Air Particulates

Air particulate monitoring at and near the MMTS is conducted to comply with federal regulatory requirements. DOE Order 5400.1, *General Environmental Protection Program,* specifies that environmental surveillance will be conducted to monitor the effects of DOE activities on off-site and on-site natural resources. Demonstration of compliance with the public dose limits of DOE Order 5400.5, *Radiation Protection of the Public and the Environment,* is based on calculations that make use of information obtained from environmental monitoring programs. In addition, DOE Order 5400.5 lists DCGs for air that provide reference values for conducting radiological environmental protection programs. The DOE guidance document, *Radiological Effluent Monitoring and Environmental Surveillance* (DOE 1991), recommends identifying and monitoring diffuse sources such as tailings piles. National primary and secondary air-quality standards (40 CFR 50), which were deemed appropriate and applicable for this facility at the program outset, define maximum acceptable levels of particulate matter necessary to protect public health.

Air particulate monitoring was initiated in August 1983. The original air sampling network consisted of three high-volume air samplers that sampled ambient air at

40 standard cubic feet per minute (scfm) for 24 hours every sixth day. Particulates were collected on a glass-fiber filter. In March 1987, 10-micron (μm) size-selective inlets were installed in the intake of the samplers to separate particulate matter 10 μm or smaller (PM_{10}) from larger particles. The 10-μm or smaller particles were considered to be the respirable and biologically damaging component and were collected on a glass-fiber filter in the sampler. The heavier, windblown particulates and fugitive dust were eliminated by the 10-μm size-selective inlet.

Wind-direction data collected on the millsite have clearly identified two principal wind vectors in the area: one to the east and one to the north. Sampling stations were located along these two predominant wind directions as well as at a background site (Figure 4). The background site (AIR-M-6) is located approximately 0.8 kilometer (0.5 mile) west of the city of Monticello near the pumphouse building for the city water supply, west of which lies relatively undisturbed desert and mountainous terrain. The intake port for this sampler is 3 meters (10 feet) above ground level. The east sampling station (AIR-M-4) is located on the millsite on the eastern edge of the East tailings pile; the sampler intake also is mounted approximately 3 meters above ground level. Located on the west side of the city of Monticello cemetery grounds is the north station (AIR-M-5). This station is 30 meters (100 feet) north of the tailings area at an elevation of 100 meters (330 feet) above the piles; the sampler intake is 4 meters (13 feet) above ground level.

During 1992, air particulate sampling was conducted from May 1 through December 31 on every sixth day for 24 hours. Sampling was suspended prior to May 1 because snow cover eliminated any potential for airborne radioparticulate emissions.

Radiological analytes measured included total uranium, radium-226, and thorium-230; PM_{10} was the only nonradiological analyte measured. Radiological analyses were performed by the Geotech Analytical Chemistry Laboratory, and PM_{10} determinations were made by subtracting the pre-sample filter weight from the post-sample filter weight. To determine the mass of PM_{10} per unit volume of air (i.e., micrograms per cubic meter [$\mu g/m^3$]), the mass difference was divided by the volume of air that passed through the filter medium. Results of 1992 sampling are reported in Tables A-5 through A-10 in Appendix A.

Table 3 compares total uranium, radium-226, and thorium-230 DCGs (inclusive of background levels) with maximum and average concentrations measured at and near the MMTS during 1992. In Appendix B, Figures B-1 through B-3 show concentrations of total uranium, thorium-230, and radium-226 as a percentage of their respective DCG at station AIR-M-4 for the period May through December 1992. Graphs for air monitoring stations AIR-M-5 and AIR-M-6, although not included in this report, exhibit similar trends to AIR-M-4 graphs. All measured concentrations are well below the respective DCGs.

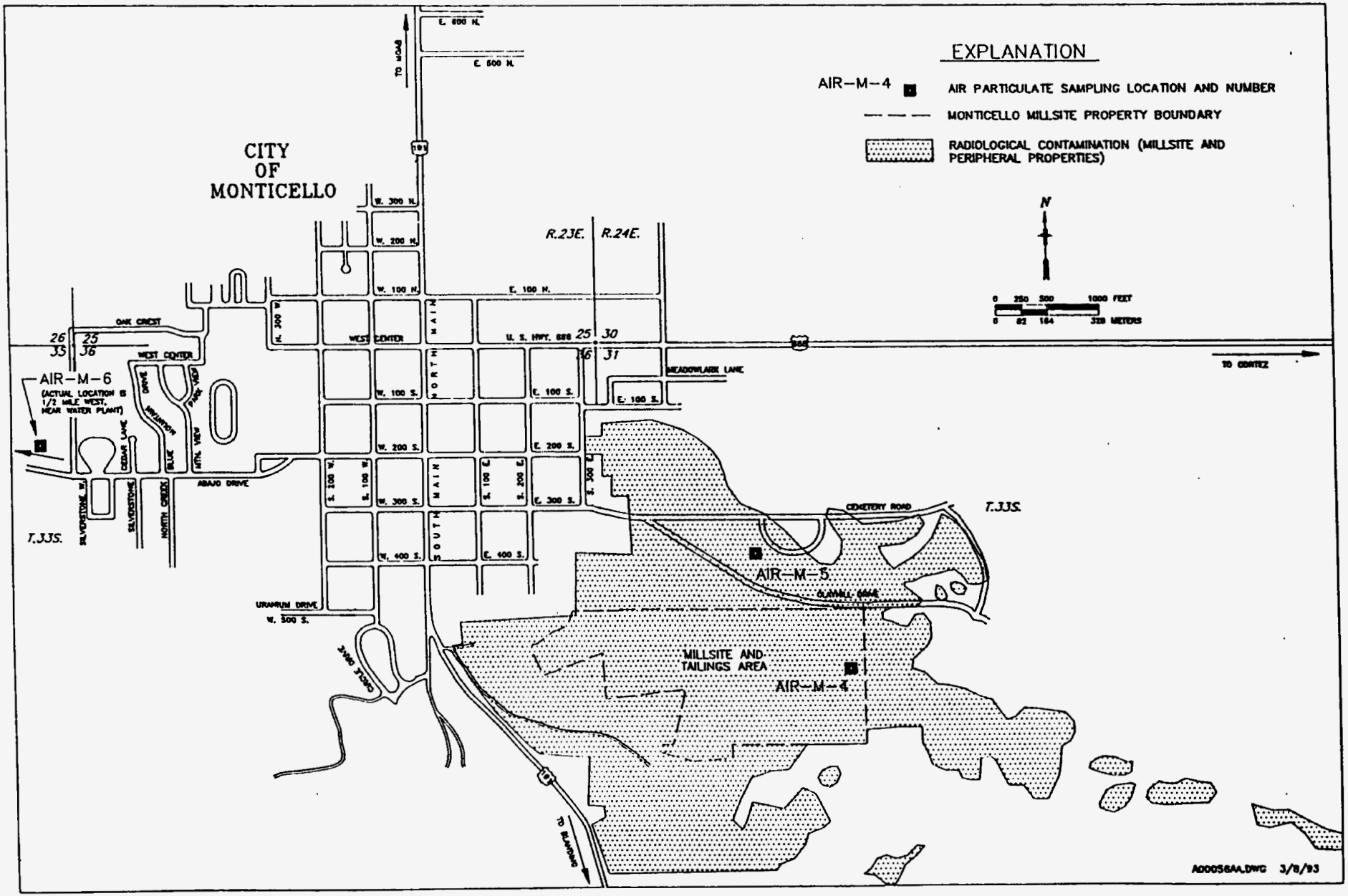

Figure 4. Air Particulate Sampling Locations At and Near the MMTS

Table 3. Results of MMTS Air Particulate Monitoring Conducted during 1992[a]

		Radiological Elements					Suspended Particulates
		Radium-226 (μCi/mL)[b]	Thorium-230 (μCi/mL)	Thorium-230 (pg/mL)	Uranium (pg/mL)	Uranium (μCi/mL)	PM_{10} (μg/m³)
DCG/Standard		1.0E-12[c]	4.0E-14	No Standard	No Standard	2.0E-12	150 Maximum 50 Annual Ave.
Station							
AIR-M-4	Maximum	4.4E-16	3.4E-16	1.8E-08	4.1E-04	2.7E-16	30.7
	Average	3.0E-16	1.9E-16	9.8E-09	2.2E-04	1.5E-16	11.9
	Count	6 (2)	6 (4)	6 (4)	6 (6)	6 (6)	20 (20)
AIR-M-5	Maximum	2.0E-16	2.9E-16	1.5E-08	8.8E-04	5.9E-16	16.5
	Average	2.0E-16	2.0E-16	1.0E-08	3.0E-04	2.0E-16	7.6
	Count	6 (1)	6 (4)	6 (4)	6 (6)	6 (6)	27 (27)
AIR-M-6	Maximum	1.5E-16	4.5E-16	2.3E-08	5.1E-04	3.4E-16	11.3
	Average	1.5E-16	3.7E-16	1.9E-08	2.9E-04	1.9E-16	5.6
	Count	6 (1)	6 (3)	6 (3)	6 (6)	6 (6)	25 (25)

[a]The numbers given in this table are defined as follows:
Maximum—Maximum concentration.
Average—Average annual concentration. Only concentrations above the detection limit were used in this calculation.
Count—Number of samples collected (number of samples having concentrations above detection limits).
[b]1 μCi/mL = 3.7×10^4 becquerels/mL.
[c]Scientific notation E = "x 10."

Acceptable levels of PM_{10} are defined by the EPA under the National Ambient Air Quality Standards. These PM_{10} standards specify a maximum annual arithmetic mean of 50 $\mu g/m^3$ and a 24-hour concentration not to exceed 150 $\mu g/m^3$. In 1992, the maximum PM_{10} annual average of 11.90 $\mu g/m^3$ and the maximum 24-hour concentration of 30.70 $\mu g/m^3$, both at station AIR-M-4 (Table 3), were below their respective compliance levels. Figure B-4 shows measured PM_{10} concentrations as a percentage of the EPA standard at station AIR-M-4 for the period May through December 1992. Although not included in this report, graphs for stations AIR-M-6 and AIR-M-7 are similar to AIR-M-4 graphs.

Direct Gamma Radiation Monitoring

A direct environmental radiation monitoring program was initiated at the MMTS in April 1991 to assess the potential gamma radiation dose to persons on and near the millsite, in accordance with DOE Order 5400.5 and the DOE guidance document, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (DOE 1991). Gamma radiation measurements are included, along with radiation measurements associated with radon and air particulates, in the calculation of total off-site dose to the public to determine compliance with the DOE standard of 100 mrem/yr above background (see Envirionmental Radiological Program Information section).

During 1992, radiation measurements were made using $CaSO_4$:Dy (calcium sulfate: dysprosium) thermoluminescent dosimeters (TLDs). Thirteen monitoring locations (Figure 5) on the millsite and surrounding areas were monitored quarterly. Results of the monitoring are presented in Appendix A, Tables A-11 through A-14, and are summarized in Table 4, which compares measured values with the DOE standard. The background level of gamma radiation, measured at station TLD-M-1, was estimated at 106 mrem/yr. Four locations on the millsite yielded annual average measurements greater than the standard; annual averages of measurements collected off the millsite were well below the standard.

Meteorology

Because of administrative and technical problems, meteorological monitoring at the MMTS was not conducted during 1992. Both problems have been resolved so that 1993 meteorological data can be collected. Because atmospheric transport models make use of several years of data to obtain average conditions, the loss of 1992 meteorological data is not expected to significantly affect modeling results.

Surface Water

Montezuma Creek, the main surface-water body in the project area, flows through the middle of the millsite property from west to east. Although flow is generally perennial,

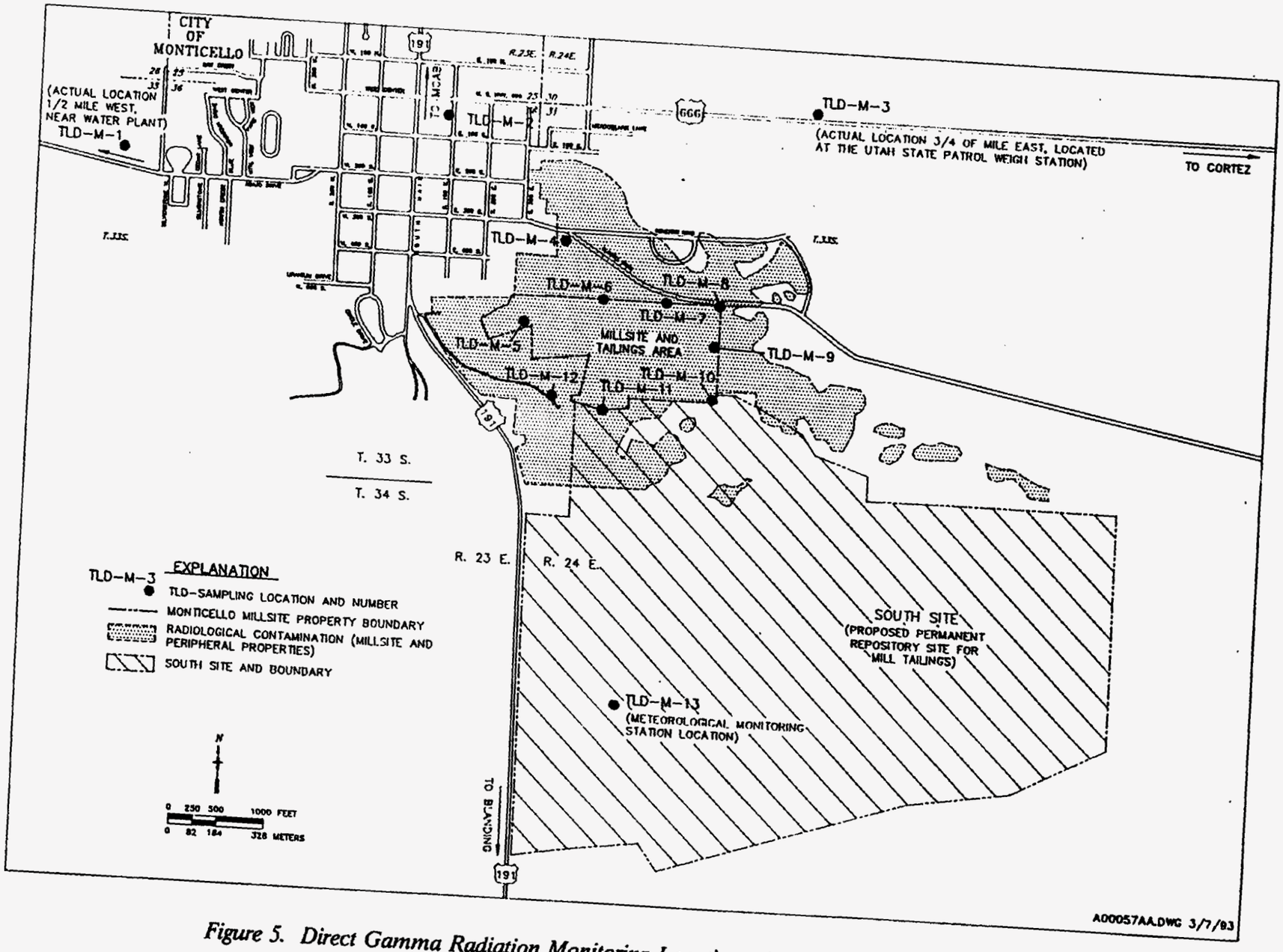

Figure 5. Direct Gamma Radiation Monitoring Locations At and Near the MMTS

Table 4. Average Annual Gamma Exposure Rates At and Near the MMTS during 1992

Sampling Location	Gamma Exposure	
	Annual Average (mrem/yr)[a]	DOE Standard (mrem/yr)[b]
On-Site		
TLD-M-05	423	206
TLD-M-06	382	206
TLD-M-07	175	206
TLD-M-08	121	206
TLD-M-09	222	206
TLD-M-10	131	206
TLD-M-11	199	206
TLD-M-12	510	206
Off-Site		
TLD-M-01	106	206
TLD-M-02	107	206
TLD-M-03	107	206
TLD-M-04	133	206
TLD-M-13	116	206

[a]1 mrem/yr = 0.01 millisieverts/yr.
[b]Standard includes background of 106 mrem/yr.

the creek can be quite low or dry during the late summer. Other surface-water bodies on the millsite include several ponds, seeps, and drainages. The primary goals of surface-water sampling at the MMTS are to 1) compare upstream water quality conditions within Montezuma Creek with conditions on and downstream of the millsite, 2) characterize the type and extent of contamination in surface-water sources, 3) verify compliance with state surface water quality standards, and 4) detect changes in water quality resulting from remedial action (Chem-Nuclear Geotech, Inc. 1992c).

Utah state regulations (Title 26, Chapter 11, Utah Code Annotated) place the segment of Montezuma Creek that flows through and below the millsite into four use classifications: 1) Domestic Source 1C, 2) Recreation and Aesthetics 2B, 3) Agriculture, and 4) Aquatic Wildlife 3B. These classifications are associated with specific numeric water-quality standards, the most stringent of which are listed in Table 5. Montezuma Creek is used for municipal water supply about 1.6 kilometers (1 mile) upstream of the millsite. Downstream of the millsite, surface water is used primarily for livestock watering.

Table 5. Comparison of State of Utah Water Quality Standards[a] with 1992 and Historical Maximum Concentrations within Montezuma Creek[b]

Constituent	State Standard		1992 Maximum[c]			Historical Maximum[c,d]		
			Up-Gradient	On-Site	Down-Gradient	Up-Gradient	On-Site	Down-Gradient
Field Measurements								
pH	6.5-9.0		7.7-7.88	7.75-8.24	6.85-8.35	---	6.6-9	6.74-9.2
Herbicides								
2,4,5-TP (Silvex)	10	µg/L	<0.2	<0.2	---	---	---	---
2,4-D	100	µg/L	<0.25	<0.25	---	---	---	---
Inorganics								
Boron	0.75	mg/L	~0.0603	~0.0758	0.115	---	---	---
Fluoride[e]	1.4-2.4	mg/L	~0.145	~0.126	0.267	---	<1	<1
Nitrate (as N)[f]	4	mg/L	~0.018	0.184	0.7	---	2.982	~0.007
Total Dissolved Solids	1200	mg/L	1540	1860	1620	---	---	---
Metals[g]								
Arsenic	0.05	mg/L	~0.0039	0.0339	0.0151	---	<0.025	0.027
Barium	1.0	mg/L	~0.121	~0.0684	~0.058	---	0.13	0.7
Cadmium	0.01	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
Chromium	0.05	mg/L	<0.006	<0.006	<0.006	---	0.013	0.004
Copper	0.2	mg/L	<0.004	<0.004	<0.004	---	---	---
Iron	1.0	mg/L	2.85	1.34	0.34	---	4	1.9
Lead	0.05	mg/L	0.004	0.0051	0.0045	---	0.007	0.003
Mercury	0.002	mg/L	<0.0001	~0.0002	<0.0001	---	<0.002	<0.002
Selenium	0.01	mg/L	<0.003	0.0115	0.0175	---	0.007	0.042
Silver	0.05	mg/L	<0.006	<0.006	<0.006	---	0.001	0.002
Pesticides and PCBs[h]								
Endrin	0.2	µg/L	<0.1	<0.1	---	---	---	---
Methoxychlor	100	µg/L	<0.51	<0.5	---	---	---	---
Toxaphene	5	µg/L	<5.1	<5	---	---	---	---
gamma-BHC (Lindane)	4	µg/L	<0.051	<0.05	---	---	---	---
Radiological								
Gross Alpha	15	pCi/L[i]	<60	80	350	---	17	547
Gross Beta	50	pCi/L	<40	40	130	---	<32	187
Radium-226 and -228	5	pCi/L	0.1	0.7	0.8	---	0.2	13

[a]State of Utah Water Quality Standards for the Montezuma Creek segment, Title 26, Chapter 11, Utah Code Annotated. The most restrictive standard for each constituent is listed. Not all state standards are listed in this table.

[b]A "---" indicates no data available; a "<" indicates that the maximum concentration was below detection limits (number shown is detection limit); a "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[c]The values are in units shown under the Standards column.

[d]Based on maximum concentrations observed from 1981 through 1991.

[e]Allowable maximum concentration varies according to the daily maximum mean air temperature.

[f]Nitrate (as N) was derived for measured nitrate using the following conversion: nitrate (as N) = $NO_3 \div 4.427$.

[g]The acid soluble method as used by the State Health Laboratory involves acidification of the sample in the field, filtration in the laboratory, no digestion process, and analysis by atomic absorption spectrophotometry. The method employed by the Geotech Analytical Chemistry Laboratory involves a partial digestion followed by filtration; this method could yield higher metal concentrations than the State Health Laboratory's method.

[h]Polychlorinated biphenyls.

[i]1 pCi/L = 3.7×10^{-2} becquerels/L.

Historically, sampling locations W-3 and W-5 (Figure 6) were used to collect upgradient water-quality samples from Montezuma Creek. In November 1992, locations SW92-01, SW92-02, and SW92-10 replaced W-3 and W-5 as upgradient sampling locations (Figure 6).

Prior to November 1992, on-site sampling was limited to three locations: the drainage between the Carbonate and Vanadium tailings piles (designated W-2 in Figure 6), the seep-fed pond adjacent to the Carbonate tailings pile (designated Carbonate Seep), and the "low spot" between the Carbonate and Vanadium tailings piles (designated as North Drainage). In November 1992, on-site sampling was expanded to include two locations on Montezuma Creek, SW92-04 and SW92-05 (Figure 6).

In past years, downstream water quality within Montezuma Creek was sampled at only three locations: the W-4 site, located approximately 100 meters (325 feet) downstream of the east boundary of the property, the Sorenson site, located approximately 2 kilometers (1.25 miles) downstream of the millsite, and the Montezuma Canyon site, located approximately 10 kilometers (6 miles) downstream of the millsite (Figure 7). In November 1992, four additional locations were sampled downstream of the property (SW92-06, SW92-07, SW92-08, and SW92-09, Figure 7).

From 1987 through April 1992, surface-water samples were analyzed for the following constituents: gross alpha, radium-226, radium-228, uranium-234, uranium-238, thorium-230, arsenic, molybdenum, nitrate, selenium, and vanadium. Alkalinity, pH, and specific conductance were measured in the field. In November 1992, surface-water analyses were expanded to include aluminum, ammonia, antimony, boron, barium, beryllium, gross beta, calcium, cadmium, chlorine, cyanide, cobalt, chromium, copper, fluorine, iron, herbicides, lead, mercury, potassium, magnesium, manganese, nickel, nitrite, pesticides/polychlorinated biphenyls (PCBs), polonium-210, radon-222, semivolatile organic compounds, silver, sodium, sulfate, total dissolved solids, thorium-232, thallium, total uranium, volatile organic compounds, and zinc. During this same period, biological oxygen demand, chemical oxygen demand, and levels of fecal coliform, total coliform, total suspended solids, and total organic carbon were determined from samples collected at locations SW92-01, SW92-02, and SW92-10 as part of a two-time sampling effort for another study. Analytical results of all 1992 surface-water samples are in Tables A-15 and A-16, Appendix A.

Concentrations of molybdenum, selenium, and uranium and gross alpha activity increase within Montezuma Creek as it flows across the millsite. This increase in mill-tailings-related contaminants within the creek may indicate that contributions from the contaminated alluvial aquifer increase in a downstream direction. Seeps from the shallow aquifer are visible along the creek downstream of the eastern millsite boundary, and creek discharge increases throughout this section for approximately 2 kilometers (1.25 miles). Historical assessments of water-quality data (UNC Geotech 1990) indicate that the highest concentrations of mill-tailings-related constituents occur at either the W-4 site or at the Sorenson site.

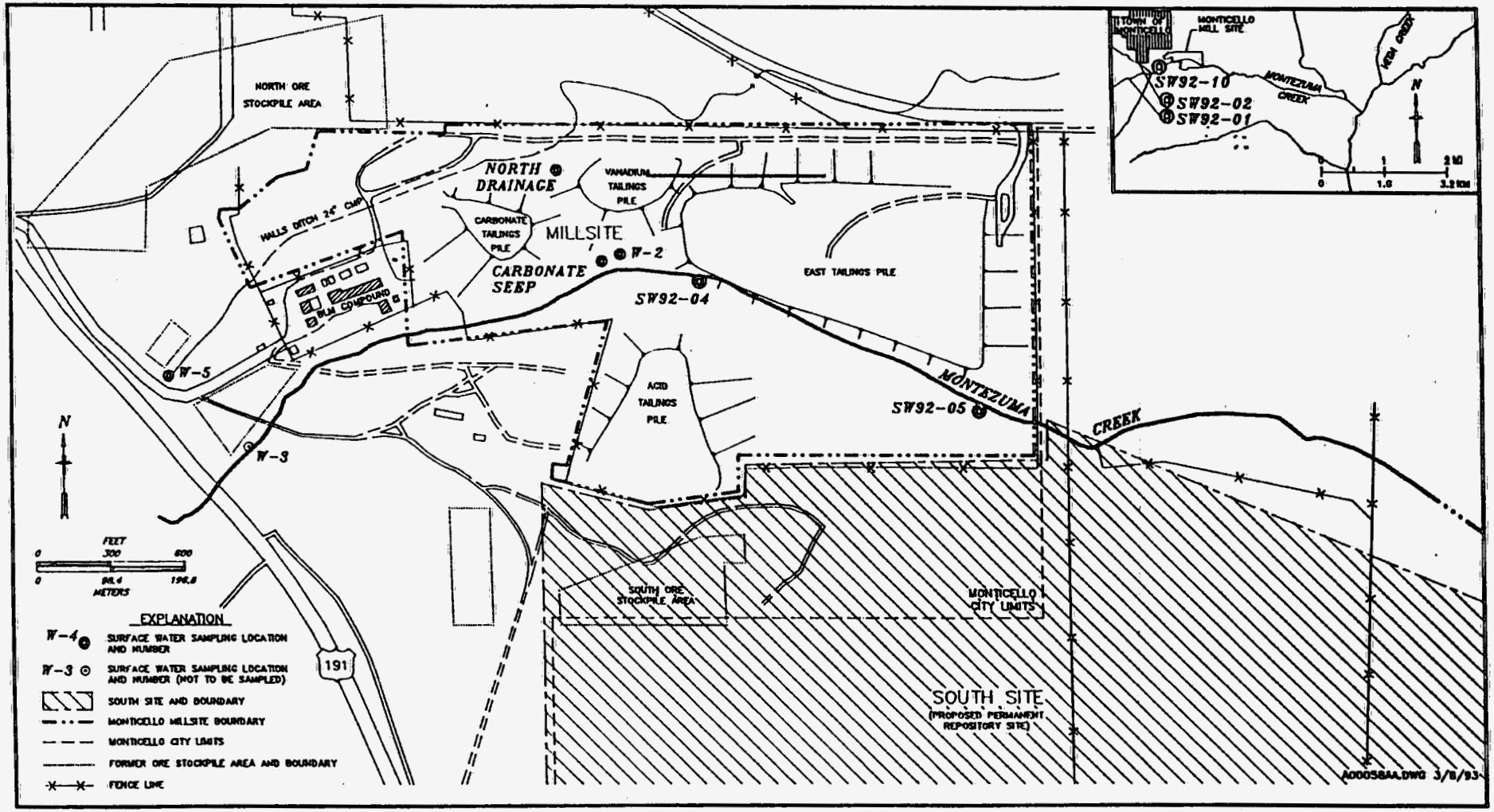

Figure 6. Surface-Water Sampling Locations On Site and Upgradient of the Monticello Millsite

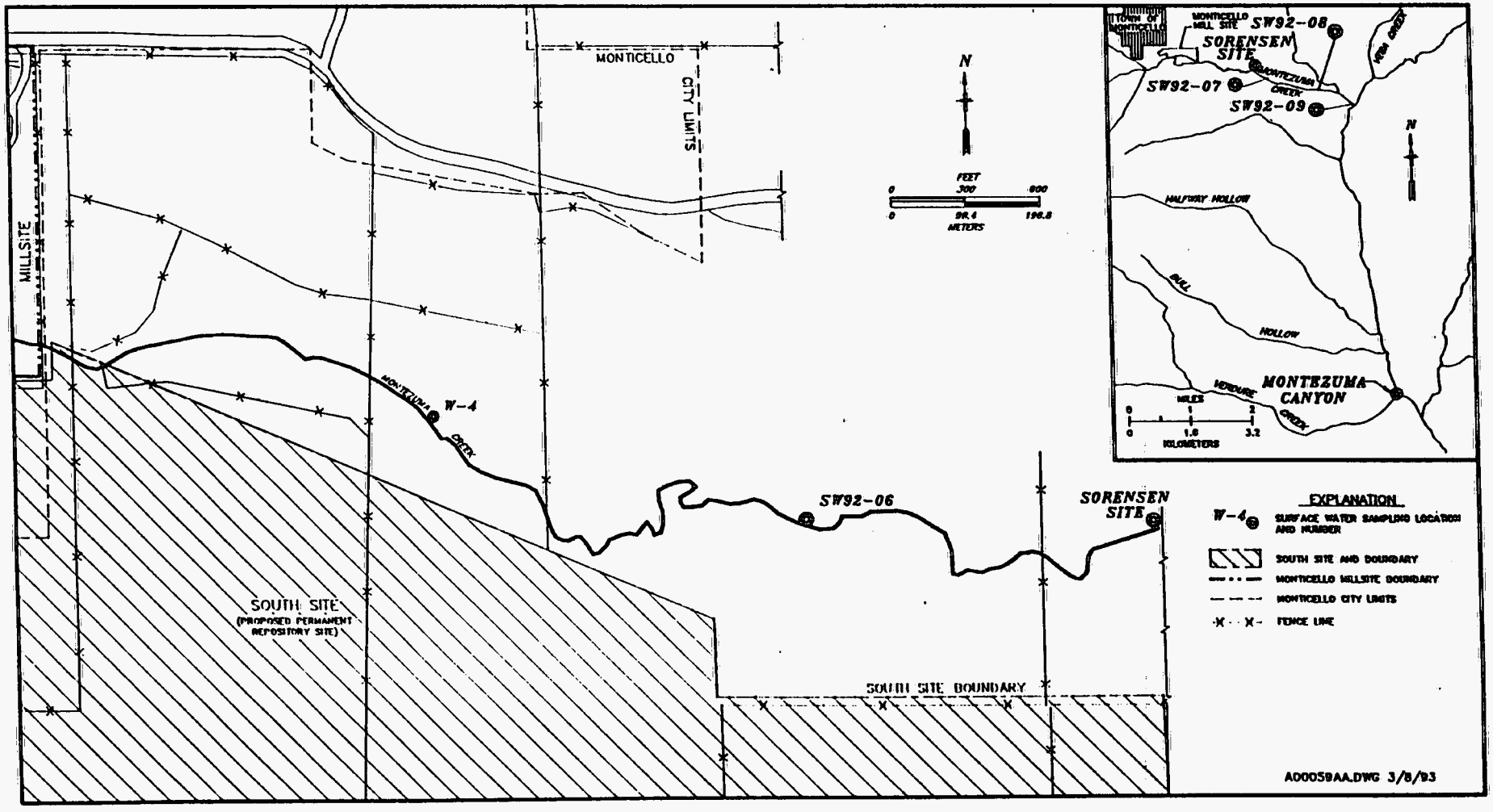

Figure 7. Surface-Water Sampling Locations Downgradient of the Monticello Millsite

Maximum 1992 and historical analyte concentrations within Montezuma Creek are compared with Utah state standards in Table 5. At upgradient sampling locations, standards for iron and total dissolved solids were exceeded. It is uncertain whether gross alpha activities exceeded the standard at upgradient locations because the detection limit, which is above the standard, was not reached. At on-site and downgradient locations, standards for selenium, total dissolved solids, and gross alpha were exceeded. The standard for gross beta also was exceeded at downgradient locations.

Graphs showing the levels of selenium and gross alpha over time at upgradient and downgradient locations on Montezuma Creek are presented in Figures B-5 through B-12, Appendix B. Since 1985, selenium concentrations consistently have been below the state standard at the upgradient (W-5) location (Figure B-5). At the W-4 and Sorenson locations, which are 0.1 and 2 kilometers downstream of the millsite, respectively, the state standard has been exceeded regularly (Figures B-6 and B-7). Ten kilometers downstream of the millsite, at the Montezuma Canyon location, selenium concentrations again are consistently below the state standard (Figure B-8). Selenium concentrations also exceeded the state standard at both on-site locations (SW92-04 and SW92-05), but because 1992 was the first year these sites were sampled, these data were not plotted.

Since 1987, gross alpha levels consistently have been below detection limits at the upgradient (W-5) location (Figure B-9). Because detection limits are variable and often above the Utah state standard, it is uncertain whether actual concentrations are above the standard. Gross alpha concentrations consistently have exceeded the state standard at the W-4, Sorenson, and Montezuma Canyon sampling locations (Figures B-10, B-11, and B-12).

Higher concentrations of mill-tailings-related contaminants are found in the ponds and seeps on the millsite than in Montezuma Creek because they are surface expressions of the ground water (see Ground-Water Protection Program section of this report). Analyte concentrations in the seeps and ponds are similar to those in ground-water samples collected from wells near the Vanadium and East tailings piles. While state surface-water standards for Montezuma Creek do not apply to these water bodies, the standards provide a useful reference for contaminant evaluations. Levels of gross alpha, arsenic, iron, selenium, and total dissolved solids exceeded state standards for these constituents in at least one of the ponds or seeps (Tables A-15 and A-16, Appendix A). Maximum levels for these contaminants in the ponds and seeps were 140 pCi/L, 0.245 mg/L, 1.17 mg/L, 0.026 mg/L, and 1,820 mg/L, respectively.

Environmental Documents/Permits

Key environmental documents initiated or completed in 1992 included the *Final Remedial Design Work Plan* (Chem-Nuclear Geotech, Inc. 1992a) for design of the remedial action at the millsite and the *Monticello Mill Tailings Site, Operable Unit III Surface- and Ground-Water Remedial Investigation/Feasibility Study* (Chem-Nuclear Geotech, Inc. 1992d) for the investigation and remediation of OU III.

There were no environmental permits issued for the MMTS in 1992 or in prior years, although compliance with the intent of applicable or relevant and appropriate requirements was demonstrated in several design documents (see Compliance Summary section of this report). Remedial work at the site was conducted in accordance with the Record of Decision (DOE 1990).

Environmental Activities Summary

Geotechnical, engineering, and hydrogeologic evaluations of the MMTS were continued from previous years or were initiated during 1992. At the South Site, shallow subsurface water-system sampling was continued in support of ground-water classification efforts, and sampling for geotechnical characterization of on-site soils and geologic strata was initiated. At and near the millsite, the OU III remedial investigation was begun. Monitoring wells were installed upgradient of the millsite to assess background water-quality conditions, and downgradient wells were installed to assess the extent of contaminant migration.

A number of environmental training courses were conducted at Geotech's Monticello Area Office during 1992 in compliance with federal regulations and DOE orders. Following is a description of the courses:

- Site Briefing—provides a briefing of site hazards and health and safety requirements for all personnel who access the MMTS.

- Radiation Worker Training—completed by all personnel who work in radiologically controlled areas.

- Respirator Wearer Training—completed by all personnel who work in areas containing potential respiratory hazards.

Environmental Radiological Program Information

Radioactive Effluent Data

The only significant radioactive effluent released from the MMTS during 1992 was radon-222, which has a half-life of 0.01 years. A radon-flux survey conducted in 1984 (UNC Geotech 1990) revealed that radon emanates from the millsite at a rate of 1,608 curies per year. Results of the 1992 radiological air particulate monitoring indicate that levels of uranium, radium-226, and thorium-230 were well below DCGs.

Environmental Sampling for Radioactivity

Surface water, ground water, and air were sampled on the millsite and analyzed for radioactive constituents. Surface- and ground-water analytes included polonium-210, radium-226, radium-228, radon-222, thorium-230, thorium-232, uranium-234, uranium-238, gross alpha, and gross beta; air was analyzed for radon and for particulates containing radium-226, thorium-230, and uranium. Sampling locations, frequency, methodology, and results are discussed under the Environmental Program Information and Ground-Water Protection Program sections in this report. Also included in those sections are comparisons of measured constituent levels with their federal and state regulatory levels.

Off-Site Dose Modeling

Off-site dose modeling was not conducted during 1992. In the MMTS RI/FS—EA (UNC Geotech 1990), source terms were calculated for exposure rates, air-particulate concentrations, and radon emissions. Calculated source terms subsequently were used as input to dose commitment models. The models used to estimate dose equivalents expected to be received by Monticello residents included the Atmospheric Transport Model (Raridon and others 1982) and a dosimetric model described by the U.S. Nuclear Regulatory Commission (1980). Site-specific data used in the modeling for calculating population dose commitments were collected from 1981 through 1987. These modeling results, excerpted from the RI/FS—EA (UNC Geotech 1990), are in Table 6.

Monitoring data (air particulates, radon, gamma radiation) collected during 1992, although more limited in scope, were used to calculate the effective dose equivalent (EDE) to the maximally exposed off-site individual near the MMTS. Because radiological air particulates were indistinguishable from background, radon and direct gamma radiation were the only significant contributors to off-site dose. Calculation of the EDE of the maximally exposed off-site individual living approximately 100 meters north of the site boundary involved a summation of the radon, air particulate, and gamma source terms.

Table 6. Population[a] Dose Commitments to Monticello Residents from Natural Background and Present Enhanced Conditions

Source	Dose Commitment	
	Whole Body	Lung
Natural Background		
Direct External Exposure	316 person-rem/yr[b]	NA[c]
Radon Daughters	NA	1265 person-rem/yr
Enhanced Conditions (excluding background)		
Direct External Exposure	165 person-rem/yr	NA
Radon Daughters	NA	188 person-rem/yr

[a]Population assumed to be 2,469.
[b]1 person-rem/yr = 0.01 person-sievert/yr.
[c]Not applicable.

The radon source term used in the EDE calculation (0.75 pCi/L) was derived from the kriged contour map of expected radon concentrations around the millsite (UNC Geotech 1990). Because the air particulate source term was insignificant (0.1 mrem/yr), it was not included in the calculation. The gamma source term was taken from the nearest off-site environmental TLD (TLD-M-4). Using the conversion 3 pCi/L ≅ 100 mrem/yr (from DOE Order 5400.5) and the 0.75 pCi/L radon value, a dose from radon exposure was calculated as 25 mrem/yr. When this dose was combined with the TLD measurement of 27 mrem/yr (exclusive of background), the resulting EDE was 52 mrem/yr. This EDE is below the DOE standard of 100 mrem/yr above background. Background dose rates in the Monticello area are 119 mrem/yr.

Environmental Nonradiological Program Information

Nonradiological Effluent Data

No nonradiological effluent was released from the MMTS during 1992.

Environmental Sampling for Nonradiological Pollution

Air particulates emanating from the uranium mill tailings piles, surface water, and ground water were sampled for a variety of nonradiological constituents on and near the MMTS. These sampling programs are described in the Environmental Program Information and Ground-Water Protection Program sections of this document. Comparisons of measured constituent levels with federal and state regulatory levels also are in those sections.

Superfund Amendments and Reauthorization Act, Title III, Reporting

No Superfund Amendments and Reauthorization Act, Title III, reporting was required at the MMTS.

Hydrogeology

There are two aquifers underlying the Monticello millsite and surrounding area. Unconsolidated materials deposited by Montezuma Creek constitute an alluvial aquifer along the valley bottom. An underlying sandstone aquifer, the Burro Canyon Formation, is separated from the alluvial aquifer by the Mancos Shale Formation (in places) and/or by fine-grained units of the Dakota Sandstone Formation, both of which act as aquitards in the MMTS area (Figure 8).

The alluvial aquifer is approximately 5 meters (16 feet) thick near Montezuma Creek in the vicinity of the Carbonate tailings pile and thins gradually upgradient and downgradient from this location and toward the valley sides. Montezuma Creek is in hydraulic communication with the alluvial aquifer on the upstream side of the East tailings pile. However, because of a realignment of the stream channel, the alluvial aquifer and Montezuma Creek are separated in the vicinity of the East tailings pile. The creek and the aquifer are reunited downstream of the East tailings pile.

Recharge of the alluvial aquifer is from infiltration of precipitation and surface water. Like the local surface waters, water levels within the aquifer fluctuate seasonally. The alluvial aquifer discharges contaminated ground water into Montezuma Creek. Transmissivity values for the alluvial aquifer beneath the East tailings pile were determined from a pump test and ranged from 3.3×10^{-4} to 5.4×10^{-4} square meters per second (2,329 to 3,744 gallons per day per foot)(Chem-Nuclear Geotech, Inc. 1991b). As alluvial ground water moves across the site, it is degraded by constituents such as arsenic, uranium, vanadium, radium, sulfate, selenium, and molybdenum, which are leached from the mill tailings. Generally, ground-water flow direction is to the east and southeast. Water from the alluvial aquifer currently is not used in the vicinity of the millsite.

The Burro Canyon Formation is a confined aquifer under the millsite that is separated from the alluvial aquifer by an aquitard consisting of the Mancos Shale Formation, where it has not eroded, and fine-grained units of the Dakota Sandstone Formation. The Burro Canyon aquifer is recharged through the tilted, exposed area of the formation located along the margin of the Abajo Dome west of the millsite. Discharge from the aquifer occurs across the Great Sage Plain, along erosional margins, and in areas where canyons dissect the formation. Numerous stock ponds and marshy areas are created as a result of spring-fed discharge from the aquifer.

To date, analysis of ground-water samples indicates that the Burro Canyon aquifer is not being degraded by the tailings piles. Water in the Burro Canyon aquifer is used as a domestic water supply source in the Monticello area.

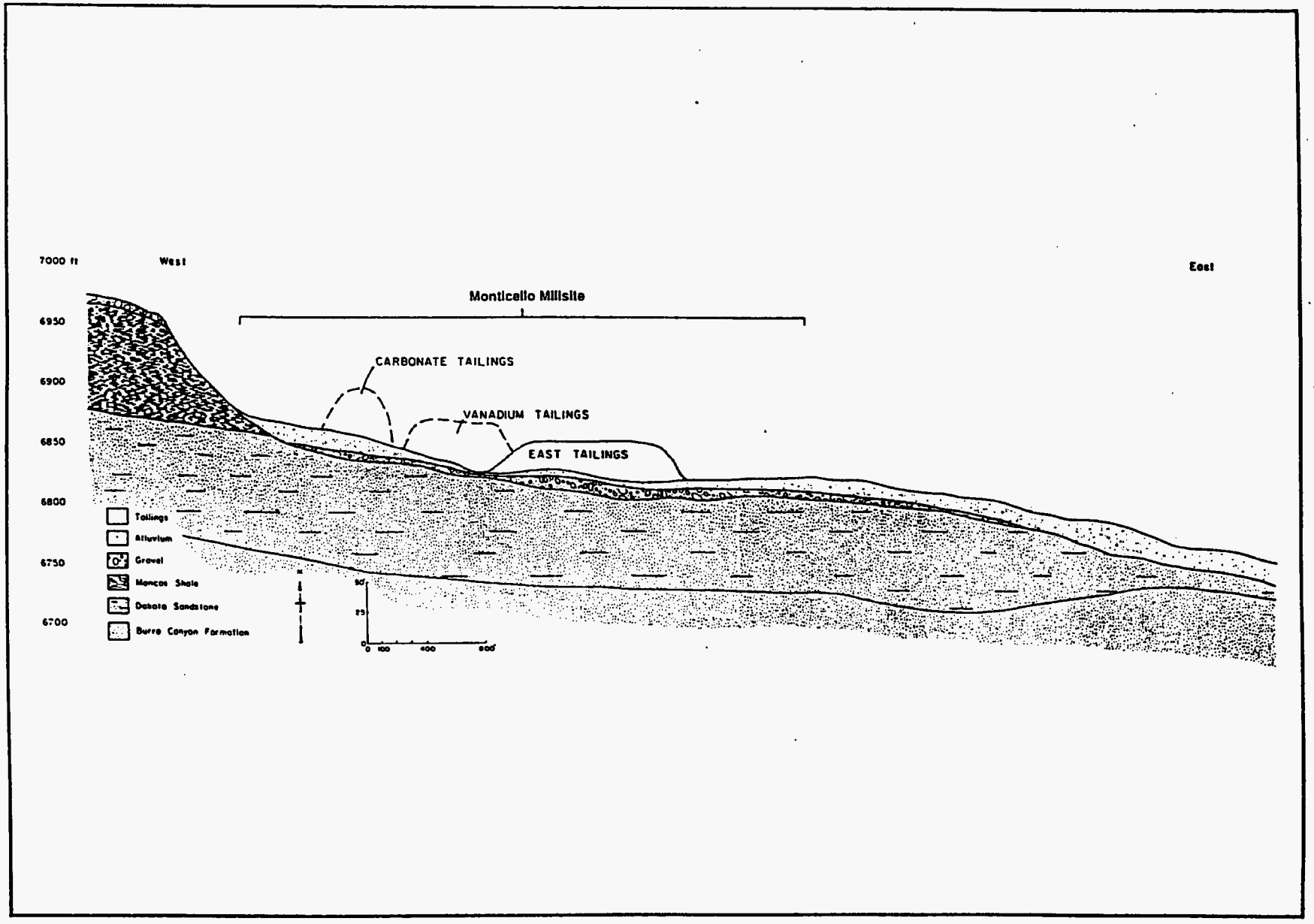

Figure 8. Generalized West-East Cross Section Through the Monticello Millsite

Ground-Water Monitoring Program

The objectives of the ground-water monitoring program at the MMTS are to 1) determine the baseline water quality and quantity conditions of the shallow alluvial aquifer and the Burro Canyon aquifer underlying the site, 2) characterize the type and extent of contamination within the alluvial aquifer, 3) determine if water quality within the Burro Canyon aquifer is being degraded by contaminated alluvial ground-water, 4) verify compliance with federal and state ground-water quality standards, and 5) detect changes in water quality resulting from remedial action at the site. Monitoring programs conducted since 1980 at wells on and downgradient of the millsite have resulted in an estimation of baseline conditions and a characterization of contaminant types within the ground water; current monitoring focuses on determining background water quality conditions upgradient of the millsite, better defining the extent of contamination downgradient of the millsite, and pursuing objectives 3 and 4. In meeting objective 4, measured water quality values are compared with federal standards promulgated by UMTRCA and state standards promulgated by Title 26, Chapter 11, of the Utah Code Annotated. The numeric standards that apply to the millsite are listed in Table 7 (Table 7 combines federal and state standards into one list for comparison purposes; federal standards are listed separately in 40 CFR 192.12).

Ground-water samples were collected from the alluvial aquifer in April 1992 with a peristaltic pump, submersible pump, or a Teflon bailer, depending on individual well conditions and analytes sampled. Alluvial well samples were collected from nine on-site wells (82-20, 82-43, 82-30B, 82-31B-E, 82-36A, 82-40A, 82-45B, 82-51, 82-52) and were analyzed for radionuclides (uranium-234/238, thorium-230, and radium-226/228,), gross alpha, metals (arsenic, molybdenum, selenium, and vanadium), and nitrate (see Figures 9 and 10 for well locations). One downgradient alluvial well (82-08) and one well completed in the Burro Canyon aquifer (84-74) were scheduled to be sampled, but access was denied by the property owner.

Activities associated with the OU III surface- and ground-water remedial investigation commenced in fall 1992. Because wells that were historically used to represent background water quality (e.g., wells 82-20 and 82-43) were not truly representative of upgradient conditions (they are located on site in contaminated areas; water quality standards for nitrate, selenium, and uranium were exceeded, at times, in samples from these wells), a series of new upgradient wells was installed in October. Upgradient wells 92-01, 92-03, and 92-05 were completed in the alluvial aquifer, and wells 92-02, 92-04, and 92-06 were completed in the Burro Canyon aquifer.

New wells also were installed in downgradient locations to better define the extent of contamination in ground water. Wells 92-07, 92-08, 92-09, and 92-11 were completed in the alluvial aquifer, well 92-10 was completed in the Burro Canyon Formation, and well 92-12 was completed in the Dakota Sandstone.

These new wells and 14 previously existing wells were sampled in November/December. Organic analytes included Target Compound List (TCL) volatiles, semivolatiles, herbicides, and pesticides/PCBs.

Table 7. Comparison of Federal[a] and State of Utah[b] Ground Water Quality Standards with 1992 and Historical Maximum Concentrations in the Alluvial Aquifer[c]

Constituent	Federal/State Standard		1992 Maximum[d]			Historical Maximum[d,e]		
			Up-Gradient	On-Site	Down-Gradient	Up-Gradient	On-Site	Down-Gradient
Field Measurement								
pH	6.5-8.5		6.48-6.84	6.48-7.72	6.73-7.05	---	6-8.25	6-8.8
Inorganics								
Fluoride	2.4	mg/L	~0.137	0.722	0.382	---	1.2	0.8
Nitrate (as N)[f]	10	mg/L	~0.082	57.375	1.581	---	67.766	33.308
Metals								
Arsenic	0.05	mg/L	<0.003	0.166	0.131	---	3.1	0.054
Barium	1	mg/L	~0.0653	~0.0533	2.25	---	0.85	1
Cadmium	0.01	mg/L	<0.001	<0.001	~0.002	---	0.005	0.005
Chromium	0.05	mg/L	<0.006	~0.0062	0.0797	---	0.037	0.01
Copper	1	mg/L	<0.004	0.0524	0.197	---	---	---
Lead	0.05	mg/L	~0.0012	0.0229	0.0891	---	<0.025	<0.025
Mercury	0.002	mg/L	<0.0001	<0.0001	<0.0001	---	0.0023	<0.001
Molybdenum	0.1	mg/L	~0.003	0.686	0.19	---	108	0.53
Selenium	0.01	mg/L	<0.003	0.0331	0.0247	---	3.3	0.06
Silver	0.05	mg/L	<0.006	~0.0067	<0.006	---	<0.025	<0.025
Zinc	5	mg/L	0.0405	0.0678	0.5	---	5.02	0.47
Radiological								
Gross Alpha (excluding Radon and Uranium)[g]	15	pCi/L	<50	767.01	119.81	---	2530.6	157.1
Radium-226 and -228	5	pCi/L	0.4	10.4	0.1	---	44	0.9
Uranium-234 and -238[h]	30	pCi/L	3.8628	2957.04	628.74	---	8524.8	2264.4
Herbicides								
2,4,5-TP (Silvex)	0.01	mg/L	<0.0002	<0.0002	<0.0002	---	<0.0002	<0.0002
2,4-D	0.1	mg/L	<0.00025	<0.00025	<0.00025	---	<0.0004	<0.0004
Pesticides								
Endrin	0.0002	mg/L	<0.0001	<0.0001	<0.0001	---	<0.0001	<0.00002
Methoxychlor	0.1	mg/L	<0.00052	<0.00052	<0.0005	---	<0.001	<0.001
Toxaphene	0.005	mg/L	<0.0052	<0.0052	<0.005	---	<0.001	<0.00096
gamma-BHC (Lindane)	0.004	mg/L	<0.00005	<0.00005	<0.00005	---	<0.00005	<0.00001
Semivolatile Organics								
1,4-Dichlorobenzene	0.075	mg/L	<0.01	<0.01	<0.01	---	<0.01	---
Volatile Organics								
1,1,1-Trichloroethane	0.2	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
1,1-Dichloroethene	0.007	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
1,2-Dichloroethane	0.005	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
Benzene	0.005	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
Carbon tetrachloride	0.005	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
Trichloroethene	0.005	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
Trihalomethanes[i]	0.1	mg/L	<0.001	<0.001	<0.001	---	<0.001	<0.001
Vinyl chloride	0.002	mg/L	<0.002	<0.002	<0.002	---	<0.002	<0.002

[a]Standards from the Uranium Mill Tailings Radiation Control Act, revised in 1986.

[b]State of Utah Ground Water Quality Standards, Title 26, Chapter 11, Utah Code Annotated. Not all state standards are listed in this table.

[c]A "---" indicates no data available; a "<" indicates that the maximum concentration was below detection limits (number shown is detection limit); a "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[d]The values are in units shown under the Standards column.

[e]Based on maximum concentrations observed from 1984 through 1991.

[f]Nitrate (as N) was derived for measured nitrate using the following conversion: nitrate (as N) = $NO_3 \div 4.427$.

[g]Measured values represent total gross alpha, including uranium.

[h]Uranium concentrations which were measured in mg/L were converted to pCi/L for comparison purposes. The conversion assumes equilibrium and an activity of 0.666 pCi/µg.

[i]Trihalomethanes include bromodichloromethane, bromoform, dibromochloromethane, and chloroform.

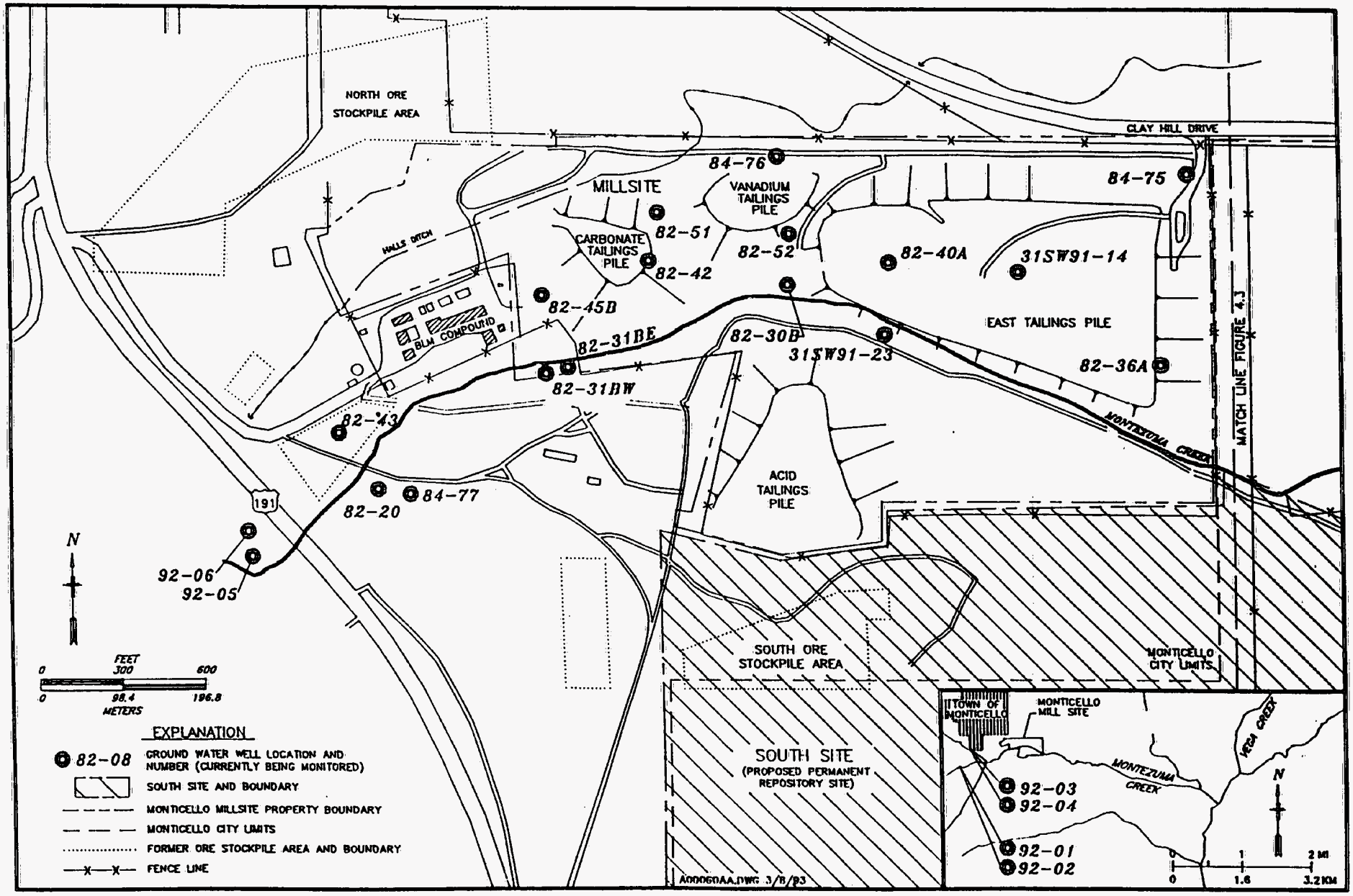

Figure 9. Ground-Water Sampling Locations On Site and Upgradient of the Monticello Millsite

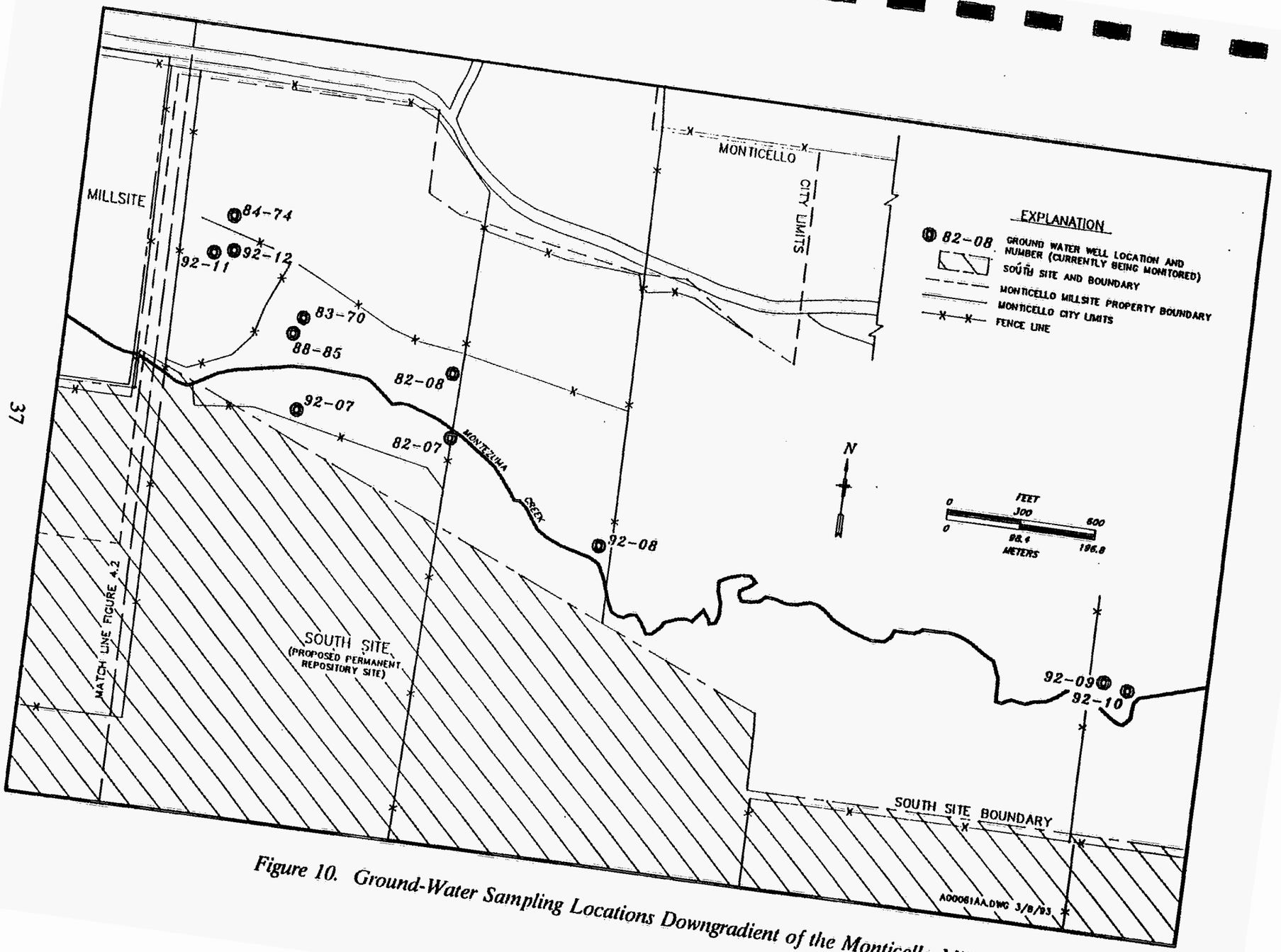

Figure 10. Ground-Water Sampling Locations Downgradient of the Monticello Millsite

Inorganic analytes included major anions (chloride, fluoride, nitrate, nitrite, and sulfate), major cations (ammonium, calcium, magnesium, potassium, and sodium), metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, cyanide, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, uranium, vanadium, and zinc), total dissolved solids, gross alpha, gross beta, and radionuclides (polonium-210, radium-226/228, thorium-230/232, uranium-234/238, and radon-222).

Samples from alluvial wells were analyzed for organic and inorganic constituents and were collected from three upgradient wells (92-01, 92-03, and 92-05), seven on-site wells (82-30B, 82-36A, 82-31BW, 82-40A, 82-42, 31SW91-14, and 31SW91-23), and six downgradient wells (82-07, 88-85, 92-07, 92-08, 92-09, and 92-11). Samples from Burro Canyon wells also were analyzed for organic and inorganic constituents and were collected from three upgradient locations (92-02, 92-04, and 92-06) and three on-site locations (84-75, 84-76, and 84-77). Samples collected from three downgradient Burro Canyon wells (83-70, 84-74, and 92-10) were analyzed for inorganic constituents only. The one Dakota Sandstone well (92-12) scheduled to be sampled was dry.

Samples were collected with a dedicated bladder pump, submersible pump, or Teflon bailer, depending on individual well conditions. Those requiring filtration were run through a 0.45-μm filter in line with the collection vessel. Samples were then preserved and analyzed according to procedures prescribed in the *Analytical Chemistry Laboratory Handbook of Analytical and Sample-Preparation Procedures* (Chem-Nuclear Geotech, Inc. 1992e). In Table 7, 1992 and historical maximum concentrations are listed and compared with federal and state ground-water standards. Analytical results of all 1992 well samples are in Appendix A, Tables A-15 through A-17.

In samples from upgradient alluvial and Burro Canyon wells, no federal or state standards were exceeded. Time-concentration graphs for arsenic, molybdenum, uranium-234 and -238, and radium-226 and -228 in well 82-20 are displayed in Appendix B, Figures B-13 through B-16, respectively. Although this well does not represent true background conditions, the time-concentration graphs from this well demonstrate low concentrations of tailings-related contamination over time and provide a comparison with time-concentration graphs from on-site and downgradient wells.

Ground water sampled from the alluvial aquifer on site is contaminated by elements leached from the tailings piles. In general, the highest contaminant concentrations are found in the vicinity of the Vanadium and East tailings piles. Historically, levels of gross alpha, arsenic, molybdenum, nitrate, selenium, uranium-234 and -238, and radium-226 and -228 and the pH have, at times, exceeded standards (Table 7). In 1992, levels of arsenic, selenium, nitrate, molybdenum, uranium-234 and -238, gross alpha, and radium-226 and -228 exceeded standards in one or more on-site ground-water samples. Time-concentration graphs for arsenic in well 82-30B and for molybdenum, uranium-234 and -238, and radium-226 and -228 in well 82-36A are shown in Appendix B, Figures B-17 through B-20, respectively. As illustrated by these graphs, measured arsenic values in well 82-30B and molybdenum, uranium-234 and -238, and radium-226 and -228 values in well 82-36A have consistently exceeded applicable standards through time.

A sample from on-site Burro Canyon well 84-77 had uranium (43.43 pCi/L) and gross alpha (46.67 pCi/L excluding uranium and radon) activities above the respective standards of 30 pCi/L and 15 pCi/L. This well will continue to be sampled to determine if the uranium and gross alpha activities measured in this sample were anomalous or if the measurements represented contamination in the aquifer. All other samples from on-site Burro Canyon wells were below standards for all constituents.

Downgradient alluvial aquifer monitoring wells on private property east of the millsite (Figure 10) have provided evidence of contaminant migration. At times in the past, levels of gross alpha, molybdenum, selenium, and uranium-234 and -238 and the pH have exceeded standards (Table 7). In November 1992, uranium activity exceeded the UMTRCA standard of 30 pCi/L in samples from all downgradient alluvial wells, including the sample from the eastern-most well (1.3 kilometers east of the millsite boundary), which had an activity of 290.10 pCi/L. In addition to uranium, standards for other constituents were exceeded in downgradient alluvial wells: molybdenum was exceeded in wells 92-07 and 92-11; selenium was exceeded in wells 92-07, 88-85, and 92-11; and gross alpha was exceeded in wells 92-07 and 82-07. (Note: gross alpha measurements were compared with the standard, which excludes uranium and radon, by subtracting uranium activities from the reported gross alpha activities; the analytical process for the determination of gross alpha eliminates radon from the sample). Standards for arsenic, barium, chromium, and lead were exceeded in well 88-85; however, these excessive concentrations likely were due to high turbidity levels (>1,000 nephelometric turbidity units) in the sample. Because the sample was analyzed for total metals, the sample was not filtered, and the analytical results reflected the chemistry of the suspended sediment as well as the water.

Representative time-concentration graphs showing levels of arsenic, molybdenum, uranium-234 and -238, and radium-226 and -228 in a downgradient well (82-08) are in Appendix B, Figures B-21 through B-24, respectively. Although it was not sampled during 1992, historical data collected from well 82-08 are representative of downgradient conditions. Other downgradient wells did not have enough years' data to provide a plot.

No federal or state standards were exceeded in ground-water samples collected from downgradient Burro Canyon Formation wells (84-74, 83-70, and 92-10) during 1992.

Sampling for TCL semivolatiles, volatiles, pesticides/PCBs, and herbicides (listed in Appendix A, Table A-18) in the alluvial and Burro Canyon aquifers was conducted in November and December. With the exception of one volatile organic compound and one semivolatile compound, all concentrations of TCL volatiles, semivolatiles, pesticides/PCBs, and herbicides were below reporting limits. The one volatile organic compound detected, acetone, was detected in a sample from upgradient alluvial well 92-06; the sample concentration was 28 micrograms per liter (μg/L). Bis(2-ethylhexyl)phthalate was detected in samples from wells 82-30B (16 μg/L) and 82-36A (39 μg/L); however, this compound also was found in the associated laboratory blanks and was probably introduced during the sampling and analysis process. Results of organic analyses are listed in Appendix A, Tables A-16 and A-17, and results are compared with federal/state standards in Table 7.

Semivolatile and volatile compounds that were not TCL constituents, but were detected, were labeled as tentatively identified compounds and are listed in Table A-17. Tentatively identified compounds were labeled as such because the laboratory instrument was not calibrated for that specific compound, which resulted in an estimated concentration. Because of the low estimated concentrations detected (<58 μg/L), these compounds are not considered potential contaminants in the ground water.

A well abandonment project at the millsite was completed in September 1992. This project included the abandonment of three U.S. Atomic Energy Commission wells that were used for water production during operation of the uranium mill and four bedrock coreholes that were installed for investigative purposes in 1982. Abandonment was necessary because of the age, unknown construction, and lack of use of the wells. Abandonment also eliminated a potential conduit for contaminant migration from the alluvial aquifer into the Burro Canyon aquifer.

Quality Assurance

The DOE-GJPO has a Quality Assurance (QA) Program that is consistent with and responsive to DOE Order 5700.6C, *Quality Assurance,* and that addresses the requirements of the American Society for Mechanical Engineers NQA-1 (1989), *Quality Assurance Program Requirements for Nuclear Facilities*. This program provides a structured approach for the application of QA principles to work performed by the DOE and is implemented through the *Quality Assurance Manual* (Chem-Nuclear Geotech, Inc. 1992f).

A Quality Assurance Program Plan (QAPP) was developed for specific environmental monitoring and surveillance needs at the MMTS and is appended to the *Environmental Monitoring Plan* (Chem-Nuclear Geotech, Inc. 1992c). The primary purpose of the QAPP is to ensure that all data and documentation are valid and traceable and meet requirements and all environmental monitoring results are valid. In addition, the QAPP addresses organizational responsibility, design, procedures, records, and audits. Field and laboratory quality control (QC), human factors, chain-of-custody, performance reporting, and independent data verification are addressed by the organizations responsible for the work.

Sampling

Sampling methodologies used for environmental monitoring at the MMTS are described in the *Environmental Procedures Catalog* (Chem-Nuclear Geotech, Inc. 1992g) and follow EPA guidance given in *Test Methods for Evaluating Solid Waste* (EPA 1986). QA and QC measures are integrated into all sampling activities to ensure sample representativeness, sample accuracy, sample precision, data comparability, and data completeness.

Laboratory Analysis

The Analytical Chemistry Laboratory performs analyses in support of the environmental monitoring programs and implements QA requirements through the *Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures* (Chem-Nuclear Geotech, Inc. 1992h). The Analytical Chemistry Laboratory's objective is to provide high-quality analytical data that adequately meet the environmental monitoring program requirements. This objective is met by implementing laboratory protocol that ensures that a sample will retain its proper identity, analytical results will be obtained and reported correctly, and a well-documented sample history will be maintained. QA and QC measures addressed include organizational responsibility, training/qualification of personnel, laboratory records, records control, laboratory QC, data acceptance, sample analysis, data recording and calculation, data deficiencies, chain-of-custody, procurement of services, and quality assessment. Sampling and analytical methodologies are in the

Analytical Chemistry Laboratory Handbook of Analytical and Sample-Preparation Procedures (Chem-Nuclear Geotech, Inc. 1992e).

The Analytical Chemistry Laboratory maintains an internal QC organization to provide independent data review and evaluation of QA data. The QA section staff includes in its audit program the evaluation of the effectiveness of the Analytical Chemistry Laboratory QC program. Subcontracted analytical laboratories are under the supervision of the Analytical Chemistry Laboratory. It is the responsibility of the Analytical Chemistry Laboratory to monitor a subcontracted laboratory's methodologies and sample results and ensure that proper QC is practiced.

Interlaboratory Quality Assurance Programs

The Analytical Chemistry Laboratory participates in the DOE interlaboratory QA program coordinated by the DOE Environmental Measurements Laboratory (EML) for radioactive materials, as mandated by DOE Order 5400.1. This interlaboratory program is designed to test the quality of the environmental measurements being reported to the DOE by its contractors. Real or synthetic environmental samples that have been prepared and thoroughly analyzed at the program laboratory are distributed to the contractors for analysis, and the results are compiled for comparison. The Analytical Chemistry Laboratory also participates in two non-DOE interlaboratory QA programs: 1) EPA's Environmental Measurement Systems Laboratory (EMSL) for radioactive materials, and 2) the National Institute for Occupational Safety and Health Proficiency Analytical Testing Program for airborne metal, silica, and asbestos. A summary of the 1992 Analytical Chemistry Laboratory's results for the EML and EMSL interlaboratory QA programs is shown in Table 8. The precision of the laboratory's results can be determined by comparing the reported laboratory values with the reference values listed in Table 8.

Data Management

Data management objectives for environmental monitoring activities are to maximize the usefulness and protection of important program information and to minimize the record-keeping burden and cost. These objectives were achieved through establishment and implementation of continuous, systematic, and effective controls for each phase of a record's life cycle. Records were stored and kept in an identifiable, legible, and retrievable state and were protected against deterioration, damage, and loss.

Data management activities included receipt of laboratory results via network transfer, data entry of information, and formatting of data for report preparation. All environmental monitoring data were stored in an ORACLE data base on a MicroVAX computer system that is maintained by Geotech.

Table 8. Summary of Analytical Results for the Interlaboratory Quality Assurance Programs

Analysis Date	Matrix Type	Isotope Analyzed	Reported Laboratory Value[a]	Reference Value[a]	Ratio Reported/ Reference
DOE Environmental Measurements Laboratory					
09/92	Air	Be-7	0.340	0.308	1.10
09/92	Air	Mn-54	0.270	0.259	1.04
09/92	Air	Co-57	0.580	0.640	0.91
09/92	Air	Co-60	0.360	0.306	1.18
09/92	Air	Sr-90	0.163	0.137	1.19
09/92	Air	Cs-134	0.410	0.372	1.10
09/92	Air	Cs-137	0.640	0.582	1.10
09/92	Air	Ce-144	0.390	0.433	0.90
09/92	Air	Pu-238	0.366	0.420	0.87
09/92	Air	Pu-239	0.400	0.450	0.89
09/92	Air	Am-241	0.285	0.320	0.89
09/92	Air	U	0.150	0.128	1.17
09/92	Soil	K-40	0.327	0.384	0.85
09/92	Soil	Sr-90	0.908	0.957	0.95
09/92	Soil	Cs-137	0.292	0.285	1.02
09/92	Soil	Pu-238	0.207	0.219	0.95
09/92	Soil	Pu-239	0.710	0.776	0.91
09/92	Soil	Am-241	0.212	0.183	1.16
09/92	Soil	U-234	0.312	0.292	1.07
09/92	Soil	U-238	0.318	0.296	1.07
09/92	Soil	U	0.110	0.232	0.47
09/92	Vegetation	K-40	0.090	0.101	0.89
09/92	Vegetation	Sr-90	0.284	0.489	0.58
09/92	Vegetation	Cs-137	0.250	0.292	0.86
09/92	Vegetation	Pu-238	0.104	0.125	0.83
09/92	Vegetation	Pu-239	0.310	0.379	0.82
09/92	Vegetation	Am-241	0.219	0.242	0.90
09/92	Water	H-3	0.141	0.118	1.19
09/92	Water	Mn-54	0.380	0.333	1.14
09/92	Water	Co-60	0.270	0.278	0.97
09/92	Water	Sr-90	0.202	0.220	0.92
09/92	Water	Cs-134	0.560	0.441	1.27
09/92	Water	Cs-137	0.370	0.290	1.28
09/92	Water	Ce-144	0.610	0.512	1.19
09/92	Water	Pu-238	0.192	0.197	0.97
09/92	Water	Pu-239	0.220	0.238	0.92
09/92	Water	Am-241	0.223	0.205	1.09
09/92	Water	U	0.940	0.906	1.04
Environmental Monitoring Systems Laboratory					
01/17/92	Water	Sr-90	19.00	20.0	0.95
01/24/92	Water	Pu-239	16.40	16.8	0.98
03/13/92	Water	U (natural)	25.27	25.3	1.00
03/27/92	Air	Alpha	7.00	7.0	1.00
03/27/92	Air	Beta	42.00	41.0	1.02
03/27/92	Air	Sr-90	15.00	15.0	1.00
03/27/92	Air	Cs-137	9.00	10.0	0.90
05/15/92	Water	Gross Alpha	18.00	15.0	1.20
05/15/92	Water	Gross Beta	43.67	44.0	0.99
07/24/92	Water	U (natural)	3.87	4.0	0.97
08/21/92	Water	Pu	8.73	9.0	0.97
08/28/92	Air	Alpha	25.00	30.0	0.83
08/28/92	Air	Beta	72.33	69.0	1.05
08/28/92	Air	Sr-90	24.33	25.0	0.97
08/28/92	Air	Cs-137	19.67	18.0	1.09
09/18/92	Water	Gross Alpha	24.67	45.0	0.55
09/18/92	Water	Gross Beta	47.33	50.0	0.95
10/09/92	Water	Co-60	9.00	10.0	0.90
10/09/92	Water	Zn-65	138.67	148.0	0.94
10/09/92	Water	Ru-106	165.67	175.0	0.95
10/09/92	Water	Cs-134	6.67	8.0	0.83
10/09/92	Water	Cs-137	9.00	8.0	1.12
10/09/92	Water	Ba-133	79.67	74.0	1.08
10/23/92	Water	H-3	5946.33	5962.0	1.00
11/06/92	Water	Ra-226	7.37	7.5	0.98
11/06/92	Water	Ra-228	5.43	5.0	1.09

[a]All values are relative. Exponents are not included; therefore, values do not indicate actual concentrations.

Records generated in support of environmental monitoring activities were subject to the requirements for maximum-level records as specified in the QAPP for the *Environmental Monitoring Plan* (Chem-Nuclear Geotech, Inc. 1992c) and in Section 13 of Geotech's *Management Policies Manual* (Chem-Nuclear Geotech, Inc. 1992i).

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APPENDIX A

MONITORING DATA

Table A-1. Radon Data for Monticello, First Quarter 1992
(Date Installed: 12/30/1991; Date Removed: 03/30/1992)

Sample Location	Detector Number	Reported Radon Value[a] (pCi/L)	Corrected Radon Value[b] (pCi/L)	Radon Concentration (μCi/mL)
RN-M-04	3176787	1.0	1.2	1.2E-09
RN-M-04	3176803	0.7	0.9	9.0E-10
RN-M-06	3176797	1.3	1.6	1.6E-09
RN-M-06	3176815	No Data	No Data	No Data
RN-M-07	3176795	0.2	0.2	2.0E-10
RN-M-07	3176809	1.0	1.3	1.3E-09
RN-M-10	3176798	0.5	0.6	6.0E-10
RN-M-10	3176811	0.7	0.9	9.0E-10
RN-M-11	3176816	0.1	0.2	2.0E-10
RN-M-11	3176817	0.3	0.3	3.0E-10
RN-M-13	3176806	0.5	0.6	6.0E-10
RN-M-13	3176814	0.6	0.7	7.0E-10
RN-M-14	3176799	0.1	0.2	2.0E-10
RN-M-14	3176807	0.2	0.2	2.0E-10
RN-M-15	3176805	0.4	0.5	5.0E-10
RN-M-15	3176810	0.3	0.4	4.0E-10

[a]The reported radon value is the result received from the subcontracted laboratory.

[b]The corrected radon value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-2. Radon Data for Monticello, Second Quarter 1992
(Date Installed: 03/30/1992; Date Removed: 06/26/1992)

Sample Location	Detector Number	Reported Radon Value[a] (pCi/L)	Corrected Radon Value[b] (pCi/L)	Radon Concentration (μCi/mL)
RN-M-04	3176885	2.1	1.9	1.9E-09
RN-M-04	3176894	1.4	1.2	1.2E-09
RN-M-06	3176869	3.4	3.1	3.1E-09
RN-M-06	3176888	2.3	2.1	2.1E-09
RN-M-07	3176815	2.7	2.4	2.4E-09
RN-M-07	3176890	0.8	0.7	7.0E-10
RN-M-10	3176884	0.7	0.6	6.0E-10
RN-M-10	3176891	0.8	0.7	7.0E-10
RN-M-11	3176880	0.2	0.2	2.0E-10
RN-M-11	3176887	0.2	0.2	2.0E-10
RN-M-13	3176873	0.1	<0.1	<1.0E-10
RN-M-13	3176879	0.5	0.5	5.0E-10
RN-M-14	3176878	0.5	0.5	5.0E-10
RN-M-14	3176886	<0.1	<0.1	<1.0E-10
RN-M-15	3176889	1.2	1.1	1.1E-09
RN-M-15	3176892	0.7	0.7	7.0E-10

[a]The reported radon value is the result received from the subcontracted laboratory. A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).

[b]The corrected radon value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-3. Radon Data for Monticello, Third Quarter 1992
(Date Installed: 06/26/1992; Date Removed: 09/30/1992)

Sample Location	Detector Number	Reported Radon Value[a] (pCi/L)	Corrected Radon Value[b] (pCi/L)	Radon Concentration (μCi/mL)
RN-M-04	3553181	2.2	2.3	2.3E-09
RN-M-04	3553190	2.1	2.1	2.1E-09
RN-M-06	3553173	3.0	3.1	3.1E-09
RN-M-06	3553184	3.0	3.1	3.1E-09
RN-M-07	3553188	1.4	1.5	1.5E-09
RN-M-07	3553192	1.5	1.6	1.6E-09
RN-M-10	3553178	0.3	0.3	3.0E-10
RN-M-10	3553185	0.6	0.6	6.0E-10
RN-M-11	3553191	0.3	0.3	3.0E-10
RN-M-11	3553193	0.3	0.3	3.0E-10
RN-M-13	3553199	0.8	0.8	8.0E-10
RN-M-13	3553201	0.6	0.6	6.0E-10
RN-M-14	3553186	0.4	0.4	4.0E-10
RN-M-14	3553187	0.2	0.2	2.0E-10
RN-M-15	3553194	0.7	0.7	7.0E-10
RN-M-15	3553197	0.8	0.8	8.0E-10

[a]The reported radon value is the result received from the subcontracted laboratory.

[b]The corrected radon value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-4. Radon Data for Monticello, Fourth Quarter 1992
(Date Installed: 09/29/1992; Date Removed: 12/21/1992)

Sample Location	Detector Number	Reported Radon Value[a] (pCi/L)	Corrected Radon Value[b] (pCi/L)	Radon Concentration (μCi/mL)
RN-M-04	3557743	0.7	1.1	1.1E-09
RN-M-04	3557750	0.8	1.3	1.3E-09
RN-M-06	3557737	1.6	2.5	2.5E-09
RN-M-06	3557753	1.7	2.7	2.7E-09
RN-M-07	3557734	0.8	1.3	1.3E-09
RN-M-07	3557740	0.8	1.3	1.3E-09
RN-M-10	3557746	0.2	0.3	3.0E-10
RN-M-10	3557747	<0.1	<0.1	<1.0E-10
RN-M-11	3557744	<0.1	<0.1	<1.0E-10
RN-M-11	3557745	<0.1	<0.1	<1.0E-10
RN-M-13	3557736	<0.1	<0.1	<1.0E-10
RN-M-13	3557741	<0.1	<0.1	<1.0E-10
RN-M-14	3557749	<0.1	<0.1	<1.0E-10
RN-M-14	3557751	<0.1	<0.1	<1.0E-10
RN-M-15	3557738	0.3	0.5	5.0E-10
RN-M-15	3557748	0.2	0.3	3.0E-10

[a]The reported radon value is the result received from the subcontracted laboratory. A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit).

[b]The corrected radon value is derived by applying a correction factor to the reported value. The correction factor is the ratio of a known exposure value to the value that is measured and reported.

Table A-5. Analytical Air Sample Results for Station AIR-M-4 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Radium-226		Thorium-230			Uranium		
						(pCi/F)[b]	(μCi/mL)	(pCi/F)	(μCi/mL)	(pg/mL)	(μg/F)	(μg/m^3)	(μCi/mL)
AIR-M-4	05/29/1992	MIT-663	5918881	33	54.00	<1.4	<4.6E-16	<0.5	<1.7E-16	<8.5E-09	1.2	4.0E-04	2.6E-16
AIR-M-4	06/05/1992	MIT-669	5918773	33	96.92	<2.6	<4.8E-16	<0.4	<7.4E-17	<3.8E-09	1.3	2.4E-04	1.6E-16
AIR-M-4	07/17/1992	MIR-893	5918804	31.6	93.78	<2.1	<4.2E-16	1.7	3.4E-16	1.7E-08	1.6	3.2E-04	2.1E-16
AIR-M-4	08/28/1992	MLY-794	5916361	31.6	159.78	<2.8	<3.3E-16	0.5	5.8E-17	3.0E-09	~0.9	~1.2E-04	~7.7E-17
AIR-M-4	09/18/1992	MLY-806	5916357	32	168.87	4.0	4.4E-16	2.4	2.6E-16	1.3E-08	3.8	4.1E-04	2.8E-16
AIR-M-4	12/04/1992	12041992-04	5916265	33	90.87	0.8	1.6E-16	0.6	1.2E-16	6.2E-09	1.2	2.4E-04	1.6E-16

[a]A "<" indicates that the maximum concentration was below limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]Picocuries per filter.

Table A-6. Analytical Air Sample Results for Station AIR-M-5 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Radium-226 (pCi/F)[b]	Radium-226 (μCi/mL)	Thorium-230 (pCi/F)	Thorium-230 (μCi/mL)	Thorium-230 (pg/mL)	Uranium (μg/F)	Uranium (μg/m^3)	Uranium (μCi/mL)
AIR-M-5	05/29/1992	MIT-664	5918880	33	52.38	<4.8	<1.6E-15	<0.4	<1.4E-16	<7.0E-09	~0.9	~3.2E-04	~2.2E-16
AIR-M-5	07/17/1992	MIR-894	5918805	31.6	95.12	<2.6	<5.1E-16	<0.5	<9.8E-17	<5.0E-09	1.1	2.2E-04	1.4E-16
AIR-M-5	08/28/1992	MLY-793	5916362	31.7	97.55	<2.3	<4.4E-16	0.8	1.5E-16	7.8E-09	1.1	2.1E-04	1.4E-16
AIR-M-5	09/18/1992	MLY-805	5916328	32	94.95	<2.1	<4.1E-16	1.5	2.9E-16	1.5E-08	1.3	2.5E-04	1.7E-16
AIR-M-5	10/04/1992	10051992-05	5916319	32.9	24.35	<2.7	<2.0E-15	0.4	2.9E-16	1.5E-08	1.2	8.8E-04	5.9E-16
AIR-M-5	12/04/1992	12041992-05	5919264	33	81.32	0.9	2.0E-16	0.3	7.7E-17	4.0E-09	1.1	2.4E-04	1.6E-16

[a]A "<" indicates that the maximum concentration was below limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]Picocuries per filter.

Table A-7. Analytical Air Sample Results for Station AIR-M-6 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Radium-226 (pCi/F)[b]	Radium-226 (μCi/mL)	Thorium-230 (pCi/F)	Thorium-230 (μCi/mL)	Thorium-230 (pg/mL)	Uranium (μg/F)	Uranium (μg/m^3)	Uranium (μCi/mL)
AIR-M-6	05/29/1992	MIT-665	5918879	33	51.50	<3.5	<1.2E-15	0.9	3.1E-16	1.6E-08	1.1	3.8E-04	2.5E-16
AIR-M-6	06/05/1992	MIT-671	5918875	33	98.38	<2.2	<4.0E-16	<0.5	<9.1E-17	<4.7E-09	1.2	2.2E-04	1.4E-16
AIR-M-6	07/17/1992	MIR-895	5918806	31.6	95.22	<2.1	<4.1E-16	<0.4	<7.8E-17	<4.0E-09	1.1	2.2E-04	1.4E-16
AIR-M-6	08/28/1992	MLY-792	5916363	31.7	98.32	<3.0	<5.7E-16	2.4	4.5E-16	2.3E-08	2.7	5.1E-04	3.4E-16
AIR-M-6	09/18/1992	MLY-804	5916329	32	93.35	<2.5	<4.9E-16	1.7	3.3E-16	1.7E-08	1.0	2.0E-04	1.3E-16
AIR-M-6	12/04/1992	12041992-06	5916266	33	82.62	0.7	1.5E-16	<0.3	<6.5E-17	<3.3E-09	0.9	2.1E-04	1.4E-16

[a]A "<" indicates that the maximum concentration was below limits (number shown is detection limit).
[b]Picocuries per filter.

Table A-8. Suspended Particulates (PM_{10}) Data for Station AIR-M-4 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[b]	Concentration ($\mu g/m^3$)
AIR-M-4	05/01/1992	MIT-653	5918893	33	23.30	0.0158	12
AIR-M-4	05/06/1992	MIT-654	5918890	33	23.27	0.0144	11
AIR-M-4	06/12/1992	MIR-876	5918869	33	23.30	0.0153	12
AIR-M-4	06/18/1992	MIR-878	5918866	33	23.28	0.0160	12
AIR-M-4	06/24/1992	MIR-881	5918863	33	23.28	0.0194	15
AIR-M-4	06/30/1992	MIR-886	5918813	33	24.22	0.0282	21
AIR-M-4	07/06/1992	MIR-887	5918812	31.6	23.28	0.0238	19
AIR-M-4	07/12/1992	MIR-890	5918809	31.6	23.28	0.0069	6
AIR-M-4	07/18/1992	MIR-896	5918803	31.6	23.27	0.0101	8
AIR-M-4	07/30/1992	MLY-777	5916397	31.6	39.78	0.0394	18
AIR-M-4	08/04/1992	MLY-780	5916394	31.6	39.82	0.0135	6
AIR-M-4	08/11/1992	MLY-783	5916370	31.6	39.83	0.0295	14
AIR-M-4	08/17/1992	MLY-786	5916369	31.6	39.82	0.0213	10
AIR-M-4	08/23/1992	MLY-789	5916366	31.6	39.83	0.0076	4
AIR-M-4	09/28/1992	09301992-04	5916323	32	39.88	0.0187	9
AIR-M-4	10/04/1992	10051992-04	5916318	33	42.95	0.0144	6
AIR-M-4	11/21/1992	11211992-04	5916270	33	3.98	0.0083	37
AIR-M-4	12/14/1992	12161992-04	5916239	33	23.95	0.0005	<1
AIR-M-4	12/20/1992	12221992-04	5916236	33	23.97	0.0046	3
AIR-M-4	12/26/1992	12311992-04	5916233	33	23.95	0.0013	1

[a]A "<" indicates that the maximum concentration was below limits (number shown is detection limit).
[b]Grams per filter.

Table A-9. Suspended Particulates (PM_{10}) Data for Station AIR-M-5 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[b]	Concentration ($\mu g/m^3$)
AIR-M-5	05/01/1992	MIT-652	5918892	33	24.32	0.0159	12
AIR-M-5	05/06/1992	MIT-655	5918889	33	24.25	0.0098	7
AIR-M-5	05/31/1992	MIT-667	5918877	33	24.25	0.0081	6
AIR-M-5	06/06/1992	MIT-673	5918870	33	24.23	0.0132	10
AIR-M-5	06/12/1992	MIR-675	5918867	33	24.23	0.0147	11
AIR-M-5	06/18/1992	MIR-879	5918864	33	22.75	0.0147	12
AIR-M-5	06/24/1992	MIR-882	5918862	33	24.25	0.0139	10
AIR-M-5	06/30/1992	MIR-885	5918814	33	24.32	0.0133	1
AIR-M-5	07/06/1992	MIR-888	5918810	31.6	24.25	0.0022	2
AIR-M-5	07/12/1992	MIR-891	5918808	31.6	24.23	0.0077	6
AIR-M-5	07/18/1992	MIR-897	5918802	31.6	24.23	0.0094	7
AIR-M-5	08/23/1992	MLY-790	5916365	31.7	24.22	0.0081	6
AIR-M-5	09/22/1992	09231992-05	5916325	32	24.27	0.0105	8
AIR-M-5	09/28/1992	09301992-05	5916322	32	24.22	0.0086	7
AIR-M-5	10/04/1992	10051992-05	5916319	32.9	24.35	0.0118	9
AIR-M-5	10/16/1992	10211992-05	5916310	32.9	24.25	0.0210	15
AIR-M-5	10/22/1992	10221992-05	5916284	32.9	24.25	0.0141	10
AIR-M-5	10/28/1992	10281992-05	5916281	32.9	24.27	0.0024	2
AIR-M-5	11/03/1992	11031992-05	5916278	32.9	24.25	0.0006	<1
AIR-M-5	11/09/1992	11091992-05	5916275	32.9	24.25	0.0069	5
AIR-M-5	11/15/1992	11151992-05	5916273	32.9	24.27	0.0163	12
AIR-M-5	11/21/1992	11211992-05	5916272	33	24.37	0.0114	8
AIR-M-5	11/27/1992	11301992-05	5916268	33	24.27	0.0225	17
AIR-M-5	12/08/1992	12081992-05	5916241	33	24.37	0.0054	4
AIR-M-5	12/14/1992	12161992-05	5916238	33	24.25	0.0013	1
AIR-M-5	12/20/1992	12221992-05	5916235	33	24.27	0.0070	5
AIR-M-5	12/26/1992	12301992-05	5916232	33	24.25	0.0063	5

[a]A "<" indicates that the maximum concentration was below limits (number shown is detection limit).
[b]Grams per filter.

Table A-10. Suspended Particulates (PM_{10}) Data for Station AIR-M-6 during 1992[a]

Sample Location	Sample Date	Ticket Number	Filter Number	Flow Rate (scfm)	Sample Time (hours)	Weight (g/F)[b]	Concentration ($\mu g/m^3$)
AIR-M-6	05/01/1992	MIT-651	5918991	33	24.00	0.0108	8
AIR-M-6	05/06/1992	MIT-656	5918888	33	48.00	0.0082	3
AIR-M-6	06/06/1992	MIT-674	5918871	33	23.97	0.0108	8
AIR-M-6	06/12/1992	MIR-877	5918868	33	23.97	0.0128	10
AIR-M-6	06/18/1992	MIR-880	5918865	33	23.98	0.0116	9
AIR-M-6	06/24/1992	MIR-883	5918861	33	23.97	0.0128	10
AIR-M-6	06/30/1992	MIR-884	5918860	33	24.08	0.0116	9
AIR-M-6	07/06/1992	MIR-889	5918811	31.6	24.02	0.0066	5
AIR-M-6	07/12/1992	MIR-892	5918807	31.6	24.00	0.0081	6
AIR-M-6	07/18/1992	MIR-898	5918801	31.6	23.98	0.0086	7
AIR-M-6	07/24/1992	MLY-776	5916398	31.6	37.73	0.0132	7
AIR-M-6	08/11/1992	MLY-785	5916371	33	32.07	0.0097	5
AIR-M-6	08/17/1992	MLY-788	5916367	31.7	15.83	0.0076	9
AIR-M-6	08/23/1992	MLY-791	5916364	31.7	23.98	0.0072	6
AIR-M-6	09/22/1992	09231992-06	5916326	32	17.33	0.0060	6
AIR-M-6	09/28/1992	09301992-06	5916321	32	24.00	0.0052	4
AIR-M-6	10/16/1992	10211992-06	5916309	32.9	24.02	0.0152	11
AIR-M-6	10/22/1992	10221992-06	5916283	32.9	24.00	0.0089	7
AIR-M-6	10/28/1992	10281992-06	5916280	32.9	24.02	0.0004	<1
AIR-M-6	11/03/1992	11031992-06	5916279	32.9	24.00	0.0007	1
AIR-M-6	11/09/1992	11091992-06	5916276	32.9	24.02	0.0125	9
AIR-M-6	11/15/1992	11151992-06	5916274	33	24.02	0.0002	<1
AIR-M-6	11/21/1992	11211992-06	5916271	33	24.17	0.0059	4
AIR-M-6	11/27/1992	11301992-06	5916269	33	23.98	0.0051	4
AIR-M-6	12/08/1992	12081992-06	5916240	33	24.18	0.0046	3
AIR-M-6	12/20/1992	12221992-06	5916234	33	23.97	0.0035	3
AIR-M-6	12/26/1992	12301992-06	5916231	33	24.00	0.0037	3

[a]A "<" indicates that the maximum concentration was below limits (number shown is detection limit).

[b]Grams per filter.

Table A-11. Environmental Radiation Exposure Data for Monticello, First Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-4	05/13/1992	12/30/1991	04/01/1992	93

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approx. Annual Exposure (mrem)
1992-1	GJ-9	TLD-M-01	22.5	0.2	88.3
1992-1	GJ-6	TLD-M-02	23.0	0.2	90.3
1992-1	GJ-4	TLD-M-03	22.8	0.2	89.5
1992-1	GJ-8	TLD-M-04	30.1	0.3	118.1
1992-1	GJ-7	TLD-M-05	93.2	1.0	365.8
1992-1	GJ-12	TLD-M-06	78.1	0.8	306.5
1992-1	GJ-5	TLD-M-06-D[c]	85.4	0.9	335.2
1992-1	GJ-11	TLD-M-07	36.7	0.4	144.0
1992-1	GJ-13	TLD-M-08	29.0	0.3	113.8
1992-1	GJ-2	TLD-M-09	44.7	0.5	175.4
1992-1	GJ-10	TLD-M-10	27.0	0.3	106.0
1992-1	GJ-14	TLD-M-11	39.2	0.4	153.8
1992-1	GJ-1	TLD-M-12	89.3	1.0	350.5

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample.

Table A-12. Environmental Radiation Exposure Data for Monticello, Second Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-5	08/04/1992	04/01/1992	07/01/1992	91

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approx. Annual Exposure (mrem)
1992-2	GJ-19	TLD-M-01	26.7	0.3	107.1
1992-2	GJ-22	TLD-M-02	26.7	0.3	107.1
1992-2	GJ-18	TLD-M-03	28.2	0.3	113.1
1992-2	GJ-21	TLD-M-04	34.7	0.4	139.2
1992-2	GJ-25	TLD-M-05	114.5	1.3	459.3
1992-2	GJ-23	TLD-M-06	101.4	1.1	406.7
1992-2	GJ-26	TLD-M-06-D[c]	97.3	1.1	390.3
1992-2	GJ-30	TLD-M-07	45.1	0.5	180.9
1992-2	GJ-20	TLD-M-08	31.3	0.3	125.5
1992-2	GJ-27	TLD-M-09	52.0	0.6	208.6
1992-2	GJ-28	TLD-M-10	33.9	0.4	136.0
1992-2	GJ-29	TLD-M-11	52.0	0.6	208.6
1992-2	GJ-24	TLD-M-12	137.8	1.5	552.7

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample.

Table A-13. Environmental Radiation Exposure Data for Monticello, Third Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-6	10/10/1992	07/01/1992	09/30/1992	92

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approx. Annual Exposure (mrem)
1992-3	GJ-21	TLD-M-01	28.9	0.3	114.7
1992-3	GJ-28	TLD-M-02	29.8	0.3	118.2
1992-3	GJ-26	TLD-M-03	28.6	0.3	113.5
1992-3	GJ-22	TLD-M-04	34.6	0.4	137.3
1992-3	GJ-29	TLD-M-05	103.6	1.1	411.0
1992-3	GJ-23	TLD-M-06	103.2	1.1	409.4
1992-3	GJ-31	TLD-M-06-D[c]	103.8	1.1	411.8
1992-3	GJ-24	TLD-M-07	49.6	0.5	196.8
1992-3	GJ-17	TLD-M-08	29.4	0.3	116.6
1992-3	GJ-27	TLD-M-09	64.9	0.7	257.5
1992-3	GJ-32	TLD-M-10	37.3	0.4	148.0
1992-3	GJ-20	TLD-M-11	58.3	0.6	231.3
1992-3	GJ-18	TLD-M-12	146.6	1.6	581.6

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample.

Table A-14. Environmental Radiation Exposure Data for Monticello, Fourth Quarter 1992

Report Number	Report Date	Date Installed	Date Removed	Days Exposed
8052-7	01/20/1993	09/30/1992	12/22/1992	83

Report ID	TLD ID	Field Location	Reported Value[a] for Quarter (mrem)	Corrected Value[b] Daily Exposure (mrem)	Approx. Annual Exposure (mrem)
1992-4	GJ-8	TLD-M-01	26.1	0.3	114.8
1992-4	GJ-13	TLD-M-02	25.4	0.3	111.7
1992-4	GJ-2	TLD-M-03	25.4	0.3	111.7
1992-4	GJ-5	TLD-M-04	31.5	0.4	138.5
1992-4	GJ-7	TLD-M-05	103.8	1.3	456.5
1992-4	GJ-4	TLD-M-06	90.9	1.1	399.7
1992-4	GJ-9	TLD-M-06-D[c]	90.9	1.1	399.7
1992-4	GJ-6	TLD-M-07	40.8	0.5	179.4
1992-4	GJ-1	TLD-M-08	29.1	0.4	128.0
1992-4	GJ-3	TLD-M-09	55.8	0.7	245.4
1992-4	GJ-12	TLD-M-10	30.3	0.4	133.2
1992-4	GJ-11	TLD-M-11	46.1	0.6	202.7
1992-4	GJ-14	TLD-M-12	126.7	1.5	557.2
1992-4	GJ-10	TLD-M-13	26.4	0.3	116.1

[a]The reported values are the results received from the subcontracted laboratory.

[b]The corrected values are derived by subtracting the exposure received by the TLDs while in transit from the reported values.

[c]Duplicate sample.

Table A-15. Water Chemistry Data, Collected April 14 and 15, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Alkalinity (ppm) (as $CaCO_3$)	Alpha (pCi/L)[b]	As (µg/L)	CDT[c] (µmhos/cm)	H_2O Depth (feet)	Mo (µg/L)	NO_3 (µg/L)	pH	Ra-226 (pCi/L)[b]
Ground Water											
82-20	MLY-691	04/14/1992	249	<40	<2.0	1973	15.33	<21.0	3010	6.57	0.2
82-30B	MLY-742	04/15/1992	419	440	95.0	1991	15.76	184	~261	6.96	0.4
82-31B-E	MLY-692	04/14/1992	348	<90	<2.0	2610	4.66	<21.0	~390	6.77	0.2
82-36A	MLY-697	04/14/1992	524	1700	~5.1	3760	46.32	686	22400	6.88	8.9
82-40A	MLY-743	04/15/1992	390	660	67.8	1905	20.62	254	~144	7.15	3.3
82-43	MLY-695	04/14/1992	262	<20	<2.0	1099	7.38	<21.0	1160	7.00	0.1
82-45B	MLY-700	04/15/1992	256	<18	<2.0	894	3.72	<21.0	1480	6.96	0.2
82-45B (Dup)	MLY-738	04/15/1992	No Data	<30	<2.0	No Data	No Data	~23.5	2960	No Data	0.2
82-51	MLY-739	04/15/1992	365	<30	<2.0	1188	8.03	<21.0	~124	7.72	0.2
82-52	MLY-744	04/15/1992	394	<60	17.6	1365	19.52	<21.0	~332	6.93	0.2
Surface Water											
Carbonate Seep	MLY-741	04/15/1992	304	2600	312	2040	No Data	198	~105	8.24	6.9
Montezuma Canyon	MLY-699	04/14/1992	240	90	~2.3	1753	No Data	<21.0	~431	7.76	0.2
North Drainage	MLY-696	04/14/1992	294	70	<2.0	1214	No Data	<21.0	2110	8.16	4.9
Sorenson	MLY-698	04/14/1992	275	120	~2.4	1453	No Data	~27.3	~539	7.17	0.4
W-2	MLY-740	04/15/1992	372	1120	1090	4120	No Data	2530	18900	9.74	4.2
W-3	MLY-693	04/14/1992	190	<15	<2.0	508	No Data	<21.0	~462	8.24	0.2
W-5	MLY-694	04/14/1992	309	<20	<2.0	865	No Data	<21.0	1570	8.13	0.4
QA/QC											
Equipment Blank	MLY-745	04/15/1992	No Data	<7	<2.0	No Data	No Data	<21.0	~421	No Data	<0.1

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

[c]Conductivity in micromhos per centimeter.

Table A-15 (continued). Water Chemistry Data, Collected April 14 and 15, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Ra-228 (pCi/L)[b]	Se (µg/L)	Temperature (degrees C)	Th-230 (pCi/L)[b]	U-234 (pCi/L)[b]	U-238 (pCi/L)[b]	V (µg/L)
Ground Water									
82-20	MLY-691	04/14/1992	<1	~30.0	8.8	<0.10	6.1	2.7	<7.0
82-30B	MLY-742	04/15/1992	<1	33.1	10.6	0.3	248.7	250.4	2980
82-31B-E	MLY-692	04/14/1992	<2	<2.0	9.3	<0.10	15.9	5.8	<7.0
82-36A	MLY-697	04/14/1992	<4	6.5	10.7	<1.3	565.1	578.7	336
82-40A	MLY-743	04/15/1992	<3	<2.0	11.5	0.6	330.8	334.4	211
82-43	MLY-695	04/14/1992	<2	<2.0	7.4	<0.14	3.7	2.2	<7.0
82-45B	MLY-700	04/15/1992	<1	<2.0	8.2	0.22	10.4	5.1	<7.0
82-45B (Dup)	MLY-738	04/15/1992	<1	<2.0	No Data	<0.16	9.7	5.4	<7.0
82-51	MLY-739	04/15/1992	<2	<2.0	10.4	0.41	16.7	15.6	~8.2
82-52	MLY-744	04/15/1992	<2	<2.0	11.1	0.4	34.8	32.4	<7.0
Surface Water									
Carbonate Seep	MLY-741	04/15/1992	<3	40.1	16.7	2.9	1101.9	1111.9	6150
Montezuma Canyon	MLY-699	04/14/1992	<2	<2.0	18.1	0.40	54.9	54.7	<7.0
North Drainage	MLY-696	04/14/1992	<2	~2.0	16.2	0.36	19.9	19.8	~17.8
Sorenson	MLY-698	04/14/1992	<2	~2.8	19.2	3.1	149.8	148.9	~43.2
W-2	MLY-740	04/15/1992	<2	796	21.8	1.1	422.0	510.6	53800
W-3	MLY-693	04/14/1992	<2	<2.0	17.3	0.11	2.9	1.1	<7.0
W-5	MLY-694	04/14/1992	<2	<2.0	13.1	0.21	10.1	7.3	<7.0
QA/QC									
Equipment Blank	MLY-745	04/15/1992	<1	<2.0	No Data	<0.17	0.2	0.1	<7.0

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-16. Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Ag (µg/L)	Al (µg/L)	Alkalinity (ppm) (as $CaCO_3$)	Alpha (pCi/L)[b]	As (µg/L)	B (µg/L)	Ba (µg/L)	Be (µg/L)	Beta (pCi/L)[b]
Ground Water											
31SW91-14	NBA-408	11/17/1992	<6.0	298	452	2500	79.0	110	~35.5	<1.0	790
31SW91-23	NBA-415	11/19/1992	<6.0	492	No Data	1100	~19.5	146	~22.4	<1.0	340
82-07	NBA-478	11/04/1992	<6.0	<20.0	379	340	<3.0	~100	~41.6	<1.0	110
82-30B	NBA-412	11/18/1992	<6.0	~80.4	415	540	166	128	~43.1	<1.0	260
82-31B-W	NBA-494	11/11/1992	<6.0	~44.0	295	40	<3.0	~68.9	~18.3	<1.0	<20
82-36A	NBA-409	11/17/1992	<6.0	414	533	2300	~14.0	147	~25.1	<1.0	760
82-40A	NBA-495	11/12/1992	~6.7	~30.1	478	3000	78.4	111	~25.7	<1.0	450
82-42	NBA-416	11/19/1992	<6.0	294	307	<50	~6.6	~44.4	~53.3	<1.0	<40
83-70	NBA-406	11/17/1992	<6.0	<20.0	211	<30	~3.0	<42.0	~19.7	<1.0	<30
83-70 (Dup)	NBA-407	11/17/1992	<6.0	~77.4	No Data	<30	<2.0	<42.0	~22.2	<1.0	<30
84-74	NBA-477	11/04/1992	<6.0	<20.0	209	<20	<3.0	~34.9	~17.1	<1.0	<30
84-75	NBA-423	12/09/1992	<4.0	~53.6	235	<30	<2.0	~44.6	~27.6	<1.0	<30
84-76	NBA-413	11/18/1992	<6.0	~28.7	189	<30	~2.2	~47.0	~57.9	<1.0	<30
84-77	NBA-490	11/11/1992	<6.0	<20.0	213	90	<3.0	~47.4	~20.8	<1.0	<30
88-85	NBA-481	11/05/1992	<6.0	108000	403	200	131	112	2250	6.2	40
92-01	NBA-497	11/12/1992	<6.0	412	265	<50	<3.0	~48.8	~27.6	<1.0	<30
92-02	NBA-421	12/09/1992	<4.0	251	150	<30	~3.7	<42.0	~79.1	<1.0	<30
92-03	NBA-440	11/12/1992	<6.0	735	267	<30	<3.0	~39.5	~65.3	<1.0	<30
92-04	NBA-417	11/19/1992	<6.0	~51.5	208	<40	~3.2	<42.0	~96.1	<1.0	<30
92-05	NBA-498	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
92-06	NBA-419	11/23/1992	<6.0	~117	258	<30	~3.3	<42.0	~28.4	<1.0	<30
92-07	NBA-482	11/05/1992	<6.0	<20.0	380	600	11.6	~92.5	~43.8	<1.0	120
92-08	NBA-483	11/05/1992	<6.0	~145	381	370	<3.0	111	~44.3	<1.0	100
92-09	NBA-485	11/10/1992	<6.0	<20.0	408	410	<3.0	126	~12.8	<1.0	40
92-10	NBA-405	11/16/1992	<6.0	~30.0	184	<30	~3.7	<42.0	~20.8	<1.0	<30
92-11	NBA-488	11/10/1992	<6.0	~51.2	382	600	28.3	106	~22.3	<1.0	120
92-11 (Dup)	NBA-489	11/10/1992	<6.0	~45.5	No Data	600	34.1	~94.4	~18.3	<1.0	110

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Ag (µg/L)	Al (µg/L)	Alkalinity (ppm) (as $CaCO_3$)	Alpha (pCi/L)[b]	As (µg/L)	B (µg/L)	Ba (µg/L)	Be (µg/L)	Beta (pCi/L)[b]
Surface Water											
Carbonate Seep	NBA-431	11/11/1992	<6.0	~96.7	255	90	245	280	~29.9	<1.0	<30
Montezuma Canyon	NBA-441	11/15/1992	<6.0	331	207	<40	~3.5	<42.0	~58.0	<1.0	<30
North Drainage	NBA-430	11/11/1992	<6.0	1290	360	70	<3.0	~76.7	~117	<1.0	<30
SW92-01	NBA-436	11/16/1992	<6.0	377	No Data	<60	~3.9	~43.6	~33.5	<1.0	<40
SW92-01 (Dup)	NBA-437	11/16/1992	<6.0	~177	No Data	<60	<2.0	<42.0	~32.7	<1.0	<40
SW92-02	NBA-438	11/17/1992	<6.0	~51.0	No Data	<40	~3.2	<42.0	~78.5	<1.0	<30
SW92-04	NBA-442	11/16/1992	<6.0	1260	320	80	33.9	~72.9	~68.4	<1.0	40
SW92-05	NBA-444	11/16/1992	<6.0	621	302	<70	18.8	~75.8	~56.1	<1.0	<40
SW92-06	NBA-427	11/10/1992	<6.0	~26.1	418	260	<3.0	115	~39.6	<1.0	50
SW92-07	NBA-445	11/17/1992	<6.0	~73.2	353	260	~3.9	~99.0	~39.3	<1.0	130
SW92-08	NBA-446	11/17/1992	<6.0	~27.1	322	120	~3.6	~76.8	~40.5	<1.0	80
SW92-09	NBA-447	11/17/1992	<6.0	~34.3	355	200	~2.9	~81.3	~40.6	<1.0	100
SW92-10	NBA-439	11/12/1992	<6.0	2920	232	<30	<3.0	~60.3	~121	<1.0	<11
Sorenson	NBA-426	11/10/1992	<6.0	~88.8	357	290	<3.0	112	~38.5	<1.0	50
W-2	NBA-433	11/11/1992	<6.0	628	297	80	14.6	~58.6	~59.7	<1.0	<30
W-2 (Dup)	NBA-434	11/11/1992	<6.0	588	No Data	140	18.8	~57.0	~56.2	<1.0	<30
W-4	NBA-428	11/10/1992	<6.0	~21.4	333	350	15.1	~96.9	~54.8	<1.0	60
QA/QC											
Equipment Blank	NBA-411	11/18/1992	<6.0	~59.2	No Data	<30	~2.5	<42.0	<7.0	<1.0	<30
Equipment Blank	NBA-432	11/11/1992	No Data	No Data	No Data	<6	No Data	No Data	No Data	No Data	<12
Trip Blank	NBA-410	11/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-414	11/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-418	11/23/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-422	12/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-429	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-443	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-476	11/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-480	11/05/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-484	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-487	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-496	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-500	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	BOD[b] (mg/L)	Ca (µg/L)	Cd (µg/L)	CDT[c] (µmhos/cm)	Cl (µg/L)	CN (µg/L)	Co (µg/L)	COD[d] (mg/L)
Ground Water										
31SW91-14	NBA-408	11/17/1992	No Data	166000	<1.0	2120	94600	<10.0	<10.0	No Data
31SW91-23	NBA-415	11/19/1992	No Data	372000	<1.0	3330	32600	<10.0	<10.0	No Data
82-07	NBA-478	11/04/1992	No Data	254000	<1.0	1581	67700	<10.0	<10.0	No Data
82-30B	NBA-412	11/18/1992	No Data	169000	<1.0	1460	55000	<10.0	<10.0	No Data
82-31B-W	NBA-494	11/11/1992	No Data	272000	<1.0	1136	6750	<10.0	<10.0	No Data
82-36A	NBA-409	11/17/1992	No Data	288000	<1.0	2910	108000	<10.0	<10.0	No Data
82-40A	NBA-495	11/12/1992	No Data	232000	<1.0	1900	65200	<10.0	~24.9	No Data
82-42	NBA-416	11/19/1992	No Data	245000	<1.0	1047	11900	<10.0	<10.0	No Data
83-70	NBA-406	11/17/1992	No Data	52700	<1.0	428	3060	<10.0	<10.0	No Data
83-70 (Dup)	NBA-407	11/17/1992	No Data	53500	<1.0	No Data	3060	<10.0	<10.0	No Data
84-74	NBA-477	11/04/1992	No Data	45500	<1.0	452	3910	<10.0	<10.0	No Data
84-75	NBA-423	12/09/1992	No Data	26000	<1.0	424	4370	<10.0	<10.0	No Data
84-76	NBA-413	11/18/1992	No Data	13900	<1.0	348	3180	<10.0	<10.0	No Data
84-77	NBA-490	11/11/1992	No Data	66500	<1.0	393	2400	<10.0	<10.0	No Data
88-85	NBA-481	11/05/1992	No Data	271000	~2.0	1418	82600	<10.0	61.2	No Data
92-01	NBA-497	11/12/1992	No Data	379000	<1.0	1336	9930	<10.0	<10.0	No Data
92-02	NBA-421	12/09/1992	No Data	66200	<1.0	314	1210	<10.0	<10.0	No Data
92-03	NBA-440	11/12/1992	No Data	137000	<1.0	594	10700	<10.0	<10.0	No Data
92-04	NBA-417	11/19/1992	No Data	75700	<1.0	475	2950	<10.0	<10.0	No Data
92-05	NBA-498	11/12/1992	No Data	No Data	No Data	976	No Data	No Data	No Data	No Data
92-06	NBA-419	11/23/1992	No Data	68000	<1.0	371	2000	<10.0	<10.0	No Data
92-07	NBA-482	11/05/1992	No Data	203000	<1.0	1507	72000	<10.0	<10.0	No Data
92-08	NBA-483	11/05/1992	No Data	262000	<1.0	1565	65300	<10.0	<10.0	No Data
92-09	NBA-485	11/10/1992	No Data	265000	<1.0	3010	96600	<10.0	<10.0	No Data
92-10	NBA-405	11/16/1992	No Data	60500	<1.0	466	5470	<10.0	<10.0	No Data
92-11	NBA-488	11/10/1992	No Data	193000	<1.0	1548	66200	<10.0	<10.0	No Data
92-11 (Dup)	NBA-489	11/10/1992	No Data	195000	<1.0	No Data	66300	<10.0	<10.0	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]Biochemical oxygen demand.

[c]Conductivity in micromhos per centimeter.

[d]Chemical oxygen demand.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	BOD[b] (mg/L)	Ca (µg/L)	Cd (µg/L)	CDT[c] (µmhos/cm)	Cl (µg/L)	CN (µg/L)	Co (µg/L)	COD[d] (mg/L)
Surface Water										
Carbonate Seep	NBA-431	11/11/1992	No Data	179000	<1.0	1518	63000	<10.0	<10.0	No Data
Montezuma Canyon	NBA-441	11/15/1992	No Data	101000	<1.0	995	37500	<10.0	<10.0	No Data
North Drainage	NBA-430	11/11/1992	No Data	191000	<1.0	884	136000	<10.0	<10.0	No Data
SW92-01	NBA-436	11/16/1992	7.0	356000	<1.0	1038	6110	<10.0	<10.0	15.6
SW92-01 (Dup)	NBA-437	11/16/1992	7.7	344000	<1.0	No Data	6070	<10.0	<10.0	11.7
SW92-02	NBA-438	11/17/1992	16.7	126000	<1.0	842	9680	<10.0	<10.0	23.3
SW92-04	NBA-442	11/16/1992	No Data	358000	<1.0	1237	18000	<10.0	<10.0	No Data
SW92-05	NBA-444	11/16/1992	No Data	352000	<1.0	1280	15700	<10.0	<10.0	No Data
SW92-06	NBA-427	11/10/1992	No Data	239000	<1.0	1183	67500	<10.0	<10.0	No Data
SW92-07	NBA-445	11/17/1992	No Data	219000	<1.0	1243	61300	<10.0	<10.0	No Data
SW92-08	NBA-446	11/17/1992	No Data	201000	<1.0	999	59400	<10.0	<10.0	No Data
SW92-09	NBA-447	11/17/1992	No Data	204000	<1.0	1044	63200	<10.0	<10.0	No Data
SW92-10	NBA-439	11/12/1992	17.0	121000	<1.0	414	10000	<10.0	<10.0	19.5
Sorenson	NBA-426	11/10/1992	No Data	243000	<1.0	1209	66500	<10.0	<10.0	No Data
W-2	NBA-433	11/11/1992	No Data	356000	<1.0	1243	15700	<10.0	<10.0	No Data
W-2 (Dup)	NBA-434	11/11/1992	No Data	348000	<1.0	No Data	17000	<10.0	<10.0	No Data
W-4	NBA-428	11/10/1992	No Data	234000	<1.0	1380	55000	<10.0	<10.0	No Data
QA/QC										
Equipment Blank	NBA-411	11/18/1992	No Data	~40.1	<1.0	No Data	~16.3	<10.0	<10.0	No Data
Equipment Blank	NBA-432	11/11/1992	No Data	No Data	No Data	No Data	~90.3	No Data	No Data	No Data
Trip Blank	NBA-410	11/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-414	11/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-418	11/23/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-422	12/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-429	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-443	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-476	11/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-480	11/05/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-484	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-487	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-496	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-500	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]Biochemical oxygen demand.

[c]Conductivity in micromhos per centimeter.

[d]Chemical oxygen demand.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Cr (µg/L)	Cu (µg/L)	DO[b] (mg/L)	Eh[c] (mV)	F (µg/L)	Fecal coliform (cfu/100mL)[d]	Fe (µg/L)	H_2O Depth (feet)	Herbicides (µg/L)
Ground Water											
31SW91-14	NBA-408	11/17/1992	<6.0	<4.0	3.3	174	688	No Data	416	45.54	No Detect
31SW91-23	NBA-415	11/19/1992	<6.0	<4.0	No Data	No Data	722	No Data	1250	15.19	No Detect
82-07	NBA-478	11/04/1992	<6.0	<4.0	1.5	117.7	257	No Data	<10.0	7.06	No Detect
82-30B	NBA-412	11/18/1992	<6.0	<4.0	3.0	118	657	No Data	208	17.65	No Detect
82-31B-W	NBA-494	11/11/1992	<6.0	<4.0	2.79	227	~129	No Data	134	4.48	No Detect
82-36A	NBA-409	11/17/1992	<6.0	52.4	No Data	No Data	489	No Data	561	46.53	No Detect
82-40A	NBA-495	11/12/1992	~6.2	<4.0	5.42	~11.0	644	No Data	3740	21.85	No Detect
82-42	NBA-416	11/19/1992	<6.0	<4.0	1.1	47	~94.0	No Data	755	37.81	No Detect
83-70	NBA-406	11/17/1992	<6.0	<4.0	6.4	148	~133	No Data	248	33.70	No Data
83-70 (Dup)	NBA-407	11/17/1992	<6.0	<4.0	No Data	No Data	~131	No Data	369	No Data	No Data
84-74	NBA-477	11/04/1992	<6.0	<4.0	1.56	187.5	~150	No Data	603	63.25	No Data
84-75	NBA-423	12/09/1992	<4.0	<5.0	1.13	198	~174	No Data	224	100.25	No Detect
84-76	NBA-413	11/18/1992	<6.0	<4.0	2.4	~92.3	252	No Data	121	107.8	No Detect
84-77	NBA-490	11/11/1992	<6.0	<4.0	6.91	215	~125	No Data	168	107.80	No Detect
88-85	NBA-481	11/05/1992	79.7	197	No Data	No Data	305	No Data	165000	7.95	No Detect
92-01	NBA-497	11/12/1992	<6.0	<4.0	4.96	210	~119	No Data	528	22.04	No Detect
92-02	NBA-421	12/09/1992	<4.0	<5.0	0.65	214	~141	No Data	498	186.94	No Detect
92-03	NBA-440	11/12/1992	<6.0	<4.0	No Data	No Data	~137	No Data	698	11.26	No Detect
92-04	NBA-417	11/19/1992	<6.0	<4.0	3.7	108	~156	No Data	113	172.70	No Detect
92-05	NBA-498	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	16.80	No Detect
92-06	NBA-419	11/23/1992	<6.0	<4.0	4.6	129	~113	No Data	312	109.40	No Detect
92-07	NBA-482	11/05/1992	<6.0	<4.0	1.88	231	326	No Data	~25.2	19.05	No Detect
92-08	NBA-483	11/05/1992	<6.0	<4.0	0.80	208	215	No Data	205	7.42	No Detect
92-09	NBA-485	11/10/1992	<6.0	<4.0	0.56	36.5	~130	No Data	1240	9.38	No Detect
92-10	NBA-405	11/16/1992	<6.0	<4.0	4.0	241	~113	No Data	~96.3	13.52	No Data
92-11	NBA-488	11/10/1992	<6.0	<4.0	0.85	2306	382	No Data	~83.2	12.26	No Detect
92-11 (Dup)	NBA-489	11/10/1992	<6.0	<4.0	No Data	No Data	381	No Data	119	No Data	No Detect

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]Dissolved oxygen.

[c]Oxidation potential in millivolts.

[d]Colony forming units per 100 milliliters.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Cr (µg/L)	Cu (µg/L)	DO[b] (mg/L)	Eh[c] (mV)	F (µg/L)	Fecal coliform (cfu/100mL)[d]	Fe (µg/L)	H_2O Depth (feet)	Herbicides (µg/L)
Surface Water											
Carbonate Seep	NBA-431	11/11/1992	<6.0	<4.0	No Data	No Data	431	No Data	130	No Data	No Detect
Montezuma Canyon	NBA-441	11/15/1992	<6.0	<4.0	No Data	No Data	~127	No Data	340	No Data	No Data
North Drainage	NBA-430	11/11/1992	<6.0	<4.0	No Data	No Data	~143	No Data	1170	No Data	No Detect
SW92-01	NBA-436	11/16/1992	<6.0	<4.0	No Data	No Data	~109	103	462	No Data	No Detect
SW92-01 (Dup)	NBA-437	11/16/1992	<6.0	<4.0	No Data	No Data	~107	114	240	No Data	No Data
SW92-02	NBA-438	11/17/1992	<6.0	<4.0	No Data	No Data	~145	672	~36.0	No Data	No Detect
SW92-04	NBA-442	11/16/1992	<6.0	<4.0	No Data	No Data	~126	No Data	1340	No Data	No Detect
SW92-05	NBA-444	11/16/1992	<6.0	<4.0	No Data	No Data	~111	No Data	654	No Data	No Detect
SW92-06	NBA-427	11/10/1992	<6.0	<4.0	No Data	No Data	~190	No Data	~70.5	No Data	No Data
SW92-07	NBA-445	11/17/1992	<6.0	<4.0	No Data	No Data	~167	No Data	159	No Data	No Data
SW92-08	NBA-446	11/17/1992	<6.0	<4.0	No Data	No Data	~185	No Data	153	No Data	No Data
SW92-09	NBA-447	11/17/1992	<6.0	<4.0	No Data	No Data	~162	No Data	~85.2	No Data	No Data
SW92-10	NBA-439	11/12/1992	<6.0	<4.0	No Data	No Data	~127	0	2850	No Data	No Data
Sorenson	NBA-426	11/10/1992	<6.0	<4.0	No Data	No Data	~165	No Data	281	No Data	No Data
W-2	NBA-433	11/11/1992	<6.0	<4.0	No Data	No Data	~114	No Data	720	No Data	No Detect
W-2 (Dup)	NBA-434	11/11/1992	<6.0	<4.0	No Data	No Data	~131	No Data	690	No Data	No Detect
W-4	NBA-428	11/10/1992	<6.0	<4.0	No Data	No Data	267	No Data	184	No Data	No Data
QA/QC											
Equipment Blank	NBA-411	11/18/1992	<6.0	<4.0	No Data	No Data	<5.0	No Data	~30.5	No Data	No Detect
Equipment Blank	NBA-432	11/11/1992	No Data	No Data	No Data	No Data	~9.6	No Data	No Data	No Data	No Data
Trip Blank	NBA-410	11/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-414	11/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-418	11/23/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-422	12/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-429	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-443	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-476	11/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-480	11/05/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-484	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-487	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-496	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-500	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]Dissolved oxygen.

[c]Oxidation potential in millivolts.

[d]Colony forming units per 100 milliliters.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Hg (µg/L)	K (µg/L)	Mg (µg/L)	Mn (µg/L)	Mo (µg/L)	Na (µg/L)	NH_4 (µg/L)	Ni (µg/L)	NO_2 (µg/L)
Ground Water											
31SW91-14	NBA-408	11/17/1992	<0.10	45200	54500	9200	490	401000	16200	~14.6	~19.3
31SW91-23	NBA-415	11/19/1992	<0.10	5800	135000	287	684	660000	7662	<11.0	~165
82-07	NBA-478	11/04/1992	<0.10	11400	46900	78.1	63.4	176000	25	<11.0	~35.8
82-30B	NBA-412	11/18/1992	<0.10	40100	35500	4910	229	237000	2980	~12.7	~14.5
82-31B-W	NBA-494	11/11/1992	<0.10	~2640	51900	133	~3.3	49800	99	<11.0	<6.0
82-36A	NBA-409	11/17/1992	<0.10	48900	108000	9600	623	627000	12400	49.2	~82.4
82-40A	NBA-495	11/12/1992	<0.10	27500	32600	3910	452	403000	3622	<11.0	<6.0
82-42	NBA-416	11/19/1992	<0.10	5240	37100	375	~3.8	50200	39	<11.0	~10.8
83-70	NBA-406	11/17/1992	<0.10	~2400	10800	266	~1.2	60200	223	<11.0	<6.0
83-70 (Dup)	NBA-407	11/17/1992	<0.10	~2680	10800	271	~1.0	61400	217	<11.0	<6.0
84-74	NBA-477	11/04/1992	<0.10	~2220	11000	227	<1.0	74200	316	<11.0	<6.0
84-75	NBA-423	12/09/1992	<0.10	~2580	7480	82.1	<1.0	98600	227	<13.0	<6.0
84-76	NBA-413	11/18/1992	<0.10	<1700	~3850	29.8	~1.0	90600	139	<11.0	~12.8
84-77	NBA-490	11/11/1992	1.2	<1700	10900	416	~2.7	40400	180	<11.0	<6.0
88-85	NBA-481	11/05/1992	<0.10	21600	82900	11400	64.6	152000	19	130	<6.0
92-01	NBA-497	11/12/1992	<0.10	~2300	56500	109	~1.7	44800	<20	<11.0	<6.0
92-02	NBA-421	12/09/1992	<0.10	~2130	9130	773	~48.2	10900	78	<13.0	<6.0
92-03	NBA-440	11/12/1992	<0.10	~2840	17600	35.6	~3.0	34200	80	<11.0	~21.2
92-04	NBA-417	11/19/1992	<0.10	~2640	12600	589	60.6	43600	125	~12.8	<6.0
92-05	NBA-498	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
92-06	NBA-419	11/23/1992	<0.10	~2860	10400	445	~3.1	30500	106	<11.0	<6.0
92-07	NBA-482	11/05/1992	<0.10	18500	42800	64.6	141	194000	22	<11.0	<6.0
92-08	NBA-483	11/05/1992	<0.10	12400	53600	1150	96.0	144000	28	<11.0	~53.4
92-09	NBA-485	11/10/1992	<0.10	~2510	67200	244	~3.2	286000	130	<11.0	~8.3
92-10	NBA-405	11/16/1992	<0.10	~1980	10800	313	~1.6	44900	195	<11.0	<6.0
92-11	NBA-488	11/10/1992	<0.10	21200	41300	1840	187	217000	2043	<11.0	~13.9
92-11 (Dup)	NBA-489	11/10/1992	<0.10	22500	41200	1860	190	219000	2260	<11.0	~17.4

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Hg (µg/L)	K (µg/L)	Mg (µg/L)	Mn (µg/L)	Mo (µg/L)	Na (µg/L)	NH_4 (µg/L)	Ni (µg/L)	NO_2 (µg/L)
Surface Water											
Carbonate Seep	NBA-431	11/11/1992	<0.10	40300	63800	105	118	271000	77	<11.0	<6.0
Montezuma Canyon	NBA-441	11/15/1992	<0.10	~3240	27800	122	~5.4	71100	14	<11.0	<6.0
North Drainage	NBA-430	11/11/1992	<0.10	8630	36800	24.3	~6.5	101000	220	<11.0	~73.8
SW92-01	NBA-436	11/16/1992	<0.10	<1700	38700	110	~2.4	26300	34	<11.0	<6.0
SW92-01 (Dup)	NBA-437	11/16/1992	<0.10	~2280	38900	72.4	~2.4	26400	36	~17.2	<6.0
SW92-02	NBA-438	11/17/1992	<0.10	<1700	19100	~9.4	~2.6	32400	39	~12.5	~12.3
SW92-04	NBA-442	11/16/1992	<0.10	5540	63100	785	~47.1	73700	34	<11.0	~26.5
SW92-05	NBA-444	11/16/1992	~0.20	~4700	61700	646	~25.3	66000	53	<11.0	~24.7
SW92-06	NBA-427	11/10/1992	<0.10	10200	53200	213	52.8	159000	34	<11.0	~9.3
SW92-07	NBA-445	11/17/1992	<0.10	8820	52200	114	53.2	152000	33	<11.0	<6.0
SW92-08	NBA-446	11/17/1992	<0.10	7340	48800	181	~36.8	141000	36	<11.0	<6.0
SW92-09	NBA-447	11/17/1992	<0.10	7510	49300	27.7	~35.8	144000	61	<11.0	<6.0
SW92-10	NBA-439	11/12/1992	<0.10	~1820	18500	68.3	~2.2	31000	37	<11.0	<6.0
Sorenson	NBA-426	11/10/1992	<0.10	8200	56600	175	54.9	165000	31	<11.0	~63.4
W-2	NBA-433	11/11/1992	<0.10	~4410	60700	742	~19.9	66900	116	<11.0	~21.8
W-2 (Dup)	NBA-434	11/11/1992	<0.10	~4500	58800	723	~18.9	64700	40	<11.0	~12.1
W-4	NBA-428	11/10/1992	<0.10	14400	48400	274	90.9	170000	87	<11.0	~37.9
QA/QC											
Equipment Blank	NBA-411	11/18/1992	<0.10	<1700	<95.0	<2.0	<1.0	<52.0	25	<11.0	<3.0
Equipment Blank	NBA-432	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	31	No Data	<6.0
Trip Blank	NBA-410	11/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-414	11/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-418	11/23/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-422	12/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-429	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-443	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-476	11/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-480	11/05/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-484	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-487	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-496	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-500	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	NO_3 (μg/L)	Pb (μg/L)	Pesticides (μg/L)	pH	Po-210 (pCi/L)[b]	Ra-226 (pCi/L)[b]	Ra-228 (pCi/L)[b]	Rn-222 (pCi/L)[b]	Sb (μg/L)
Ground Water											
31SW91-14	NBA-408	11/17/1992	7080	3.3	No Detect	6.65	<0.3	0.2	<2	1259	<1.0
31SW91-23	NBA-415	11/19/1992	254000	22.9	No Detect	6.79	<0.4	0.2	<2	99	<1.0
82-07	NBA-478	11/04/1992	7000	<1.0	No Detect	6.83	6.9	0.1	<2	532	~1.4
82-30B	NBA-412	11/18/1992	~41.3	3.1	No Detect	7.00	<0.3	0.3	<2	4030	<1.0
82-31B-W	NBA-494	11/11/1992	~31.9	<1.0	No Detect	6.48	<0.5	<0.1	<2	1150	<1.0
82-36A	NBA-409	11/17/1992	18200	4.6	No Detect	6.65	2.6	10.4	<4	5670	~1.4
82-40A	NBA-495	11/12/1992	~19.1	<1.0	No Detect	7.24	1.1	7.0	<3	10560	<1.0
82-42	NBA-416	11/19/1992	~122	3.9	No Detect	6.75	<0.3	2.9	<2	973	<1.0
83-70	NBA-406	11/17/1992	~120	~2.4	No Data	7.40	<0.3	1.2	<2	317	<1.0
83-70 (Dup)	NBA-407	11/17/1992	~77.9	~2.2	No Data	No Data	<0.3	1.1	<2	332	<1.0
84-74	NBA-477	11/04/1992	~38.3	<1.0	No Data	7.62	<0.5	1.1	<2	87	<1.0
84-75	NBA-423	12/09/1992	~27.6	21.7	No Detect	7.02	<0.3	0.8	<2	146	<1.0
84-76	NBA-413	11/18/1992	~65.0	~2.1	No Detect	7.99	<0.3	0.2	<1	147	<1.0
84-77	NBA-490	11/11/1992	~67.2	<1.0	No Detect	7.19	<0.5	0.6	<2	76	~1.0
88-85	NBA-481	11/05/1992	5950	89.1	No Detect	6.74	<0.5	<0.1	<2	730	~1.9
92-01	NBA-497	11/12/1992	~31.8	<1.0	No Detect	6.48	<0.5	0.1	<1	595	<1.0
92-02	NBA-421	12/09/1992	~21.0	~2.2	No Detect	6.77	<0.4	0.5	<2	82	~5.0
92-03	NBA-440	11/12/1992	~364	~1.2	No Detect	6.84	<0.7	0.4	<2	267	~1.9
92-04	NBA-417	11/19/1992	~84.3	12.1	No Detect	7.43	<0.3	0.6	<2	94	~10.9
92-05	NBA-498	11/12/1992	No Data	No Data	No Detect	6.59	No Data	No Data	No Data	203	No Data
92-06	NBA-419	11/23/1992	~23.4	~2.4	No Detect	No Data	<0.3	0.5	<2	47	~1.6
92-07	NBA-482	11/05/1992	5640	<1.0	No Detect	6.73	<0.5	0.1	<1	1050	<1.0
92-08	NBA-483	11/05/1992	779	<1.0	No Detect	6.82	<0.5	0.1	<2	720	~1.4
92-09	NBA-485	11/10/1992	~36.9	<1.0	No Detect	7.05	<0.5	0.1	<2	196	~1.2
92-10	NBA-405	11/16/1992	~43.6	~1.6	No Data	7.23	<0.3	1.0	<2	147	~1.2
92-11	NBA-488	11/10/1992	5610	<1.0	No Detect	6.86	<0.5	0.1	<2	856	<1.0
92-11 (Dup)	NBA-489	11/10/1992	5650	<1.0	No Detect	No Data	<0.5	<0.1	<1	926	~1.6

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multipled by 10^{-9} will result in μCi/mL.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	NO_3 (µg/L)	Pb (µg/L)	Pest (µg/L)	pH	Po-210 (pCi/L)[b]	Ra-226 (pCi/L)[b]	Ra-228 (pCi/L)[b]	Rn-222 (pCi/L)[b]	Sb (µg/L)
Surface Water											
Carbonate Seep	NBA-431	11/11/1992	~34.7	<1.0	No Detect	8.00	<0.5	4.4	<5	3303	~1.2
Montezuma Canyon	NBA-441	11/15/1992	~49.5	3.6	No Data	8.35	<0.3	<0.1	<1	55	~1.1
North Drainage	NBA-430	11/11/1992	9120	~1.3	No Detect	7.74	<0.6	2.6	<5	436	~1.1
SW92-01	NBA-436	11/16/1992	~81.3	~2.3	No Detect	7.70	<0.3	0.1	<1	<36	<1.0
SW92-01 (Dup)	NBA-437	11/16/1992	~55.2	4.0	No Data	No Data	<0.3	<0.1	<1	<36	<1.0
SW92-02	NBA-438	11/17/1992	~54.3	~2.5	No Detect	7.80	<0.3	0.1	<2	61	<1.0
SW92-04	NBA-442	11/16/1992	814	4.6	No Detect	7.75	<0.3	0.7	<2	621	<1.0
SW92-05	NBA-444	11/16/1992	462	5.1	No Detect	7.85	<0.3	0.5	<1	187	~1.7
SW92-06	NBA-427	11/10/1992	~82.8	<1.0	No Data	7.77	<0.6	0.4	<2	63	<1.0
SW92-07	NBA-445	11/17/1992	1720	~2.2	No Data	8.31	<0.3	0.8	<2	485	<1.0
SW92-08	NBA-446	11/17/1992	~49.2	~1.3	No Data	8.15	<0.3	0.5	<2	165	<1.0
SW92-09	NBA-447	11/17/1992	~105	4.5	No Data	7.68	<0.3	0.2	<2	159	<1.0
SW92-10	NBA-439	11/12/1992	~42.7	3.6	No Data	7.88	No Data	<0.1	<1	<30	~1.4
Sorenson	NBA-426	11/10/1992	~128	<1.0	No Data	7.82	<0.6	0.6	<3	171	<1.0
W-2	NBA-433	11/11/1992	~558	<1.0	No Detect	7.71	<0.5	0.7	<2	589	<1.0
W-2 (Dup)	NBA-434	11/11/1992	578	3.3	No Detect	No Data	<0.5	0.8	<2	610	<1.0
W-4	NBA-428	11/10/1992	3100	<1.0	No Data	6.85	<0.5	0.8	<2	334	<1.0
QA/QC											
Equipment Blank	NBA-411	11/18/1992	~8.0	4.4	No Detect	No Data	<0.3	<0.1	<1	<33	<1.0
Equipment Blank	NBA-432	11/11/1992	~50.3	No Data	No Data	No Data	<0.5	0.0	<1	No Data	No Data
Trip Blank	NBA-410	11/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-414	11/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-418	11/23/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-422	12/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-429	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-443	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-476	11/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-480	11/05/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-484	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-487	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-496	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-500	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated).

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Se (µg/L)	Semivolatiles (µg/L)	SO_4 (µg/L)	Sr (µg/L)	Total coliform (cfu/100mL)[b]	TDS[c] (mg/L)	Temperature (degrees C)	Th-230 (pCi/L)[d]
Ground Water										
31SW91-14	NBA-408	11/17/1992	9.5	See Table	1030000	1910	No Data	2140	16.6	<0.6
31SW91-23	NBA-415	11/19/1992	~4.1	See Table	2090000	4140	No Data	3960	10.4	<0.5
82-07	NBA-478	11/04/1992	18.0	No Detect	703000	2680	No Data	1520	11.4	<0.3
82-30B	NBA-412	11/18/1992	14.7	See Table	613000	1350	No Data	1520	10.2	<0.3
82-31B-W	NBA-494	11/11/1992	<3.0	See Table	688000	2880	No Data	1420	10.0	<0.3
82-36A	NBA-409	11/17/1992	6.4	See Table	1700000	3800	No Data	3700	10.6	<0.6
82-40A	NBA-495	11/12/1992	<3.0	See Table	997000	3550	No Data	2160	10.8	1.0
82-42	NBA-416	11/19/1992	~2.6	See Table	522000	1990	No Data	1060	9.5	<0.3
83-70	NBA-406	11/17/1992	<2.0	No Data	98000	1460	No Data	360	10.4	<0.3
83-70 (Dup)	NBA-407	11/17/1992	<2.0	No Data	96800	1480	No Data	440	No Data	<0.3
84-74	NBA-477	11/04/1992	<3.0	No Data	101000	1370	No Data	520	10.3	<0.3
84-75	NBA-423	12/09/1992	<2.0	See Table	88000	721	No Data	488	10.4	<0.3
84-76	NBA-413	11/18/1992	<2.0	No Detect	55200	332	No Data	360	10.5	0.61
84-77	NBA-490	11/11/1992	<3.0	See Table	97300	1550	No Data	360	9.7	0.76
88-85	NBA-481	11/05/1992	24.7	See Table	554000	3590	No Data	1420	11.0	<0.3
92-01	NBA-497	11/12/1992	<3.0	See Table	940000	3520	No Data	1780	9.9	0.31
92-02	NBA-421	12/09/1992	<2.0	See Table	72400	710	No Data	288	11.4	<0.3
92-03	NBA-440	11/12/1992	<3.0	See Table	186000	1030	No Data	600	10.7	0.3
92-04	NBA-417	11/19/1992	~3.0	See Table	137000	1790	No Data	440	10.2	0.54
92-05	NBA-498	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	9.3	No Data
92-06	NBA-419	11/23/1992	~2.3	See Table	90100	1430	No Data	420	9.5	<0.3
92-07	NBA-482	11/05/1992	18.8	See Table	620000	2070	No Data	1520	11.4	<0.3
92-08	NBA-483	11/05/1992	10.0	See Table	694000	2660	No Data	1620	11.8	0.71
92-09	NBA-485	11/10/1992	<3.0	No Detect	990000	1930	No Data	2140	11.3	0.34
92-10	NBA-405	11/16/1992	<2.0	No Data	106000	1330	No Data	400	9.9	0.38
92-11	NBA-488	11/10/1992	12.0	See Table	643000	1960	No Data	1500	11.6	0.91
92-11 (Dup)	NBA-489	11/10/1992	12.5	See Table	647000	1970	No Data	1500	No Data	0.92

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated); "See Table" indicates that the reader should refer to Table A-17 in this report for a list of detected constituents.

[b]Colony forming units per 100 milliliters.

[c]Total dissolved solids.

[d]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Se (µg/L)	Semivolatiles (µg/L)	SO_4 (µg/L)	Sr (µg/L)	Total coliform (cfu/100mL)[b]	TDSC[c] (mg/L)	Temperature (degrees C)	Th-230 (pCi/L)[d]	Th-232 (pCi/L)[d]
Surface Water											
Carbonate Seep	NBA-431	11/11/1992	26.0	No Detect	1010000	1780	No Data	1820	6.2	0.81	<0.3
Montezuma Canyon	NBA-441	11/15/1992	~2.4	No Data	238000	1500	No Data	680	3.3	0.13	<0.06
North Drainage	NBA-430	11/11/1992	7.6	See Table	301000	2010	No Data	1080	9.0	0.54	<0.3
SW92-01	NBA-436	11/16/1992	<2.0	See Table	848000	2910	336	1400	5.2	0.20	0.09
SW92-01 (Dup)	NBA-437	11/16/1992	<2.0	No Data	836000	2960	276	1540	No Data	0.23	<0.07
SW92-02	NBA-438	11/17/1992	<2.0	See Table	175000	990	696	520	7.3	<0.3	<0.3
SW92-04	NBA-442	11/16/1992	11.5	See Table	928000	2990	No Data	1860	4.7	<0.11	<0.07
SW92-05	NBA-444	11/16/1992	6.1	See Table	913000	2920	No Data	1760	7.4	<0.11	<0.07
SW92-06	NBA-427	11/10/1992	8.7	No Data	666000	2550	No Data	1620	3.0	0.57	<0.3
SW92-07	NBA-445	11/17/1992	~3.1	No Data	661000	2390	No Data	1480	7.2	<0.3	<0.3
SW92-08	NBA-446	11/17/1992	<2.2	No Data	588000	2180	No Data	1300	2.7	<0.3	<0.3
SW92-09	NBA-447	11/17/1992	~2.7	No Data	602000	2190	No Data	1320	3.4	<0.3	<0.3
SW92-10	NBA-439	11/12/1992	<3.0	No Data	173000	886	0	517	0.4	0.09	<0.04
Sorenson	NBA-426	11/10/1992	~4.5	No Data	696000	2520	No Data	1580	3.5	0.46	<0.3
W-2	NBA-433	11/11/1992	~5.2	See Table	898000	2860	No Data	1760	4.5	0.60	<0.3
W-2 (Dup)	NBA-434	11/11/1992	~3.4	See Table	909000	2780	No Data	1760	No Data	0.80	<0.3
W-4	NBA-428	11/10/1992	17.5	No Data	724000	2560	No Data	1520	7.7	0.58	<0.3
QA/QC											
Equipment Blank	NBA-411	11/18/1992	<2.0	See Table	<85.0	<1.0	No Data	220	No Data	<0.3	0.34
Equipment Blank	NBA-432	11/11/1992	No Data	No Data	<170	No Data	No Data	No Data	No Data	0.49	<0.3
Trip Blank	NBA-410	11/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-414	11/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-418	11/23/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-422	12/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-429	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-443	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-476	11/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-480	11/05/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-484	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-487	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-496	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Trip Blank	NBA-500	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated); "See Table" indicates that the reader should refer to Table A-17 in this report for a list of detected constituents.

[b]Colony forming units per 100 milliliters.

[c]Total dissolved solids.

[d]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Th-232 (pCi/L)[b]	Tl (µg/L)	TSS[c] (mg/L)	U (µg/L)	U-234 (pCi/L)[b]	U-238 (pCi/L)[b]	V (µg/L)	Volatile (µg/L)	Zn (µg/L)
Ground Water											
31SW91-14	NBA-408	11/17/1992	<0.4	<1.0	No Data	2530	852.09	880.90	992	No Detect	-12.9
31SW91-23	NBA-415	11/19/1992	<0.3	<1.0	No Data	1210	385.22	382.20	<7.0	No Detect	24.2
82-07	NBA-478	11/04/1992	<0.3	<1.0	No Data	535	150.50	151.26	75.5	No Detect	-10.0
82-30B	NBA-412	11/18/1992	<0.3	<1.0	No Data	746	250.45	253.46	2920	No Detect	-9.9
82-31B-W	NBA-494	11/11/1992	<0.3	<1.0	No Data	21.7	17.84	16.58	<7.0	No Detect	-14.9
82-36A	NBA-409	11/17/1992	<0.4	-1.1	No Data	2940	861.05	863.06	482	No Detect	67.8
82-40A	NBA-495	11/12/1992	<0.3	<1.0	No Data	4440	1438.43	1427.34	215	No Detect	23.9
82-42	NBA-416	11/19/1992	<0.3	<1.0	No Data	53.4	19.10	17.28	154	No Detect	21.2
83-70	NBA-406	11/17/1992	<0.3	<1.0	No Data	<1.0	0.84	0.40	<7.0	No Data	-11.3
83-70 (Dup)	NBA-407	11/17/1992	<0.3	<1.0	No Data	<1.0	0.78	0.19	<7.0	No Data	-19.5
84-74	NBA-477	11/04/1992	<0.3	<1.0	No Data	<1.0	0.63	0.08	<7.0	No Data	<6.0
84-75	NBA-423	12/09/1992	<0.3	<1.0	No Data	<1.0	0.85	0.32	<9.0	No Detect	-7.0
84-76	NBA-413	11/18/1992	0.60	<1.0	No Data	<1.0	1.12	0.86	<7.0	No Detect	-11.7
84-77	NBA-490	11/11/1992	<0.3	<1.0	No Data	<1.0	21.35	22.08	<7.0	No Detect	-16.0
88-85	NBA-481	11/05/1992	<0.3	-1.8	No Data	413	113.42	115.19	2890	No Detect	500
92-01	NBA-497	11/12/1992	<0.3	<1.0	No Data	5.8	0.37	0.38	<7.0	No Detect	<6.0
92-02	NBA-421	12/09/1992	<0.3	<1.0	No Data	-2.6	11.55	0.83	<9.0	No Detect	-9.9
92-03	NBA-440	11/12/1992	<0.3	<1.0	No Data	-4.8	1.07	1.15	<7.0	No Detect	40.5
92-04	NBA-417	11/19/1992	<0.3	<1.0	No Data	-2.8	11.09	1.26	<7.0	No Detect	20.0
92-05	NBA-498	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
92-06	NBA-419	11/23/1992	<0.3	<1.0	No Data	<1.0	1.80	0.17	<7.0	See Table	-18.4
92-07	NBA-482	11/05/1992	<0.3	<1.0	No Data	717	258.85	241.92	452	No Detect	-15.4
92-08	NBA-483	11/05/1992	<0.3	<1.0	No Data	578	210.73	211.40	<7.0	No Detect	-8.7
92-09	NBA-485	11/10/1992	<0.3	<1.0	No Data	395	146.76	143.43	<7.0	No Detect	-6.3
92-10	NBA-405	11/16/1992	0.18	<1.0	No Data	<1.0	1.88	0.13	<7.0	No Data	-9.2
92-11	NBA-488	11/10/1992	<0.3	<1.0	No Data	820	304.22	316.62	875	No Detect	-12.2
92-11 (Dup)	NBA-489	11/10/1992	<0.3	<1.0	No Data	819	311.31	317.43	885	No Detect	-12.0

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "-" indicates an approximate value (the value was outside the limits for which the instrument was calibrated); "See Table" indicates that the reader should refer to Table A-17 in this report for a list of detected constituents.

[b]The values listed multiplied by 10^{-9} will result in µCi/mL.

[c]Total suspended solids.

Table A-16 (continued). Water Chemistry Data, Collected November 4 through December 9, 1992, At and Near the MMTS[a]

Sample Location	Ticket Number	Sample Date	Tl (µg/L)	TOC[b] (mg/L)	TSS[c] (mg/L)	U (µg/L)	U-234 (pCi/L)[d]	U-238 (pCi/L)[d]	V (µg/L)	Volatile (µg/L)	Zn (µg/L)
Surface Water											
Carbonate Seep	NBA-431	11/11/1992	<1.0	No Data	No Data	2490	815.38	823.12	4090	No Detect	~18.2
Montezuma Canyon	NBA-441	11/15/1992	<1.0	No Data	No Data	20.8	7.42	6.74	<7.0	No Data	86.7
North Drainage	NBA-430	11/11/1992	<1.0	No Data	No Data	100	39.01	32.05	~28.7	No Detect	~19.0
SW92-01	NBA-436	11/16/1992	<1.0	2.8	83	~3.6	3.04	1.23	<7.0	No Detect	~9.4
SW92-01 (Dup)	NBA-437	11/16/1992	<1.0	2.9	62	~3.5	3.21	1.58	<7.0	No Data	~13.2
SW92-02	NBA-438	11/17/1992	<1.0	2.4	<5	~4.8	3.42	2.07	<7.0	No Detect	<6.0
SW92-04	NBA-442	11/16/1992	<1.0	No Data	No Data	167	58.13	57.56	777	No Detect	~9.9
SW92-05	NBA-444	11/16/1992	<1.0	No Data	No Data	163	55.34	57.21	446	No Detect	~14.5
SW92-06	NBA-427	11/10/1992	<1.0	No Data	No Data	436	132.82	148.85	~9.1	No Data	~8.9
SW92-07	NBA-445	11/17/1992	<1.0	No Data	No Data	411	145.02	143.77	~11.7	No Data	~16.8
SW92-08	NBA-446	11/17/1992	<1.0	No Data	No Data	309	118.46	119.95	~7.2	No Data	~6.4
SW92-09	NBA-447	11/17/1992	<1.0	No Data	No Data	305	111.35	109.06	~8.5	No Data	~19.7
SW92-10	NBA-439	11/12/1992	<1.0	6.4	121	No Data	2.78	1.40	~7.1	No Data	44.2
Sorenson	NBA-426	11/10/1992	<1.0	No Data	No Data	456	176.51	174.24	~13.0	No Data	34.0
W-2	NBA-433	11/11/1992	<1.0	No Data	No Data	159	59.89	59.22	318	No Detect	38.3
W-2 (Dup)	NBA-434	11/11/1992	<1.0	No Data	No Data	164	80.98	78.19	314	No Detect	~8.3
W-4	NBA-428	11/10/1992	<1.0	No Data	No Data	508	147.52	160.09	280	No Data	57.8
QA/QC											
Equipment Blank	NBA-411	11/18/1992	<1.0	No Data	No Data	<1.0	0.12	0.04	<7.0	See Table	~10.1
Equipment Blank	NBA-432	11/11/1992	No Data	No Data	No Data	No Data	3.03	3.10	No Data	No Data	No Data
Trip Blank	NBA-410	11/18/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-414	11/19/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-418	11/23/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-422	12/08/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-429	11/11/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-443	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-476	11/04/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-480	11/05/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-484	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-487	11/10/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-496	11/12/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data
Trip Blank	NBA-500	11/16/1992	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Detect	No Data

[a]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated); "See Table" indicates that the reader should refer to Table A-17 in this report for a list of detected constituents.

[b]Total organic carbon.

[c]Total suspended solids.

[d]The values listed multiplied by 10^{-9} will result in µCi/mL.

Table A-17. Volatile and Semivolatile Organic Constituents Observed in Samples Collected from Ground Water At and Near the MMTS, November 4 through December 9, 1992[a,b]

Sample Location	Ticket Number	Sample Date	10544-50-0[c,d] (µg/L)	117-81-7[c,e] (µg/L)	2605-67-6[c,d] (µg/L)	629-97-0[c,d] (µg/L)	630-02-4[c,d] (µg/L)	67-64-1[f,e] (µg/L)	67-66-3[f,e] (µg/L)	75-27-4[f,e] (µg/L)
Ground Water										
31SW91-14	NBA-408	11/17/1992	N	~3	N	N	N	<2	<1	<1
31SW91-23	NBA-415	11/19/1992	N	~3	N	N	N	<2	<1	<1
82-07	NBA-478	11/04/1992	N	<10	N	N	N	<2	<1	<1
82-30B	NBA-412	11/18/1992	N	16	N	N	N	<2	<1	<1
82-31B-W	NBA-494	11/11/1992	N	~3	N	N	N	<2	<1	<1
82-36A	NBA-409	11/17/1992	N	39	N	~3.0	~3.0	<2	<1	<1
82-40A	NBA-495	11/12/1992	N	~2	N	N	N	<2	<1	<1
82-42	NBA-416	11/19/1992	N	~2	N	N	N	<2	<1	<1
83-70	NBA-406	11/17/1992	N	N	N	N	N	N	N	N
83-70 (Dup)	NBA-407	11/17/1992	N	N	N	N	N	N	N	N
84-74	NBA-477	11/04/1992	N	N	N	N	N	N	N	N
84-75	NBA-423	12/09/1992	N	~2	N	N	N	<2	<1	<1
84-76	NBA-413	11/18/1992	N	<10	N	N	N	<2	<1	<1
84-77	NBA-490	11/11/1992	N	~2	N	N	N	<2	<1	<1
88-85	NBA-481	11/05/1992	N	~2	N	N	N	<2	<1	<1
92-01	NBA-497	11/12/1992	N	~2	N	N	N	<2	<1	<1
92-02	NBA-421	12/09/1992	N	~3	N	N	N	<2	<1	<1
92-03	NBA-440	11/12/1992	N	~3	N	N	N	<2	<1	<1
92-04	NBA-417	11/19/1992	N	~4	N	N	N	<2	<1	<1
92-05	NBA-498	11/12/1992	N	N	N	N	N	<2	<1	<1
92-06	NBA-419	11/23/1992	N	~2	N	N	N	28	<1	<1
92-07	NBA-482	11/05/1992	N	~6	N	N	N	<2	<1	<1
92-08	NBA-483	11/05/1992	N	~1	N	N	N	<2	<1	<1
92-09	NBA-485	11/10/1992	N	<10	N	N	N	<2	<1	<1
92-10	NBA-405	11/16/1992	N	N	N	N	N	N	N	N
92-11	NBA-488	11/10/1992	N	~3	N	N	N	<2	<1	<1
92-11 (Dup)	NBA-489	11/10/1992	N	~2	N	N	N	<2	<1	<1

[a]CAS Number 10544-50-0 Sulfur, mol. (S8)
CAS Number 67-64-1 Acetone
CAS Number 2605-67-6 Acetic acid, (triphenylphosp)
CAS Number 629-97-0 Docosane
CAS Number 630-02-4 Octacosane
CAS Number 117-81-7 Bis(2-ethylhexyl)phthalate
CAS Number 67-66-3 Chloroform
CAS Number 75-27-4 Bromodichloromethane

[b]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). An "N" indicates that the constituent was not observed.

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]TCL constituent.

[f]Volatile compound.

Table A-17 (continued). Volatile and Semivolatile Organic Constituents Observed in Samples Collected from Ground Water At and Near the MMTS, November 4 through December 9, 1992[a,b]

Sample Location	Ticket Number	Sample Date	10544-50-0[c,d] (µg/L)	117-81-7[c,e] (µg/L)	2605-67-6[c,d] (µg/L)	629-97-0[c,d] (µg/L)	630-02-4[c,d] (µg/L)	67-64-1[f,e] (µg/L)	67-66-3[f,e] (µg/L)	75-27-4[f,e] (µg/L)
Surface Water										
Carbonate Seep	NBA-431	11/11/1992	N	<20	N	N	N	<2	<1	<1
Montezuma Canyon	NBA-441	11/15/1992	N	N	N	N	N	N	N	N
North Drainage	NBA-430	11/11/1992	~58	~2	N	N	N	<2	<1	<1
SW92-01	NBA-436	11/16/1992	N	~4	~12	N	N	<2	<1	<1
SW92-01 (Dup)	NBA-437	11/16/1992	N	N	N	N	N	N	N	N
SW92-02	NBA-438	11/17/1992	N	~3	~25.66	N	N	<2	<1	<1
SW92-04	NBA-442	11/16/1992	N	<10	N	N	N	<2	<1	<1
SW92-05	NBA-444	11/16/1992	N	~3	~14	N	N	<2	<1	<1
SW92-06	NBA-427	11/10/1992	N	N	N	N	N	N	N	N
SW92-07	NBA-445	11/17/1992	N	N	N	N	N	N	N	N
SW92-08	NBA-446	11/17/1992	N	N	N	N	N	N	N	N
SW92-09	NBA-447	11/17/1992	N	N	N	N	N	N	N	N
SW92-10	NBA-439	11/12/1992	N	N	N	N	N	N	N	N
Sorenson	NBA-426	11/10/1992	N	N	N	N	N	N	N	N
W-2	NBA-433	11/11/1992	N	~2	N	N	N	<2	<1	<1
W-2 (Dup)	NBA-434	11/11/1992	N	~2	N	N	N	<2	<1	<1
W-4	NBA-428	11/10/1992	N	N	N	N	N	N	N	N
QA/QC										
Equipment Blank	NBA-411	11/18/1992	N	~2	N	N	N	12	42	3.0
Equipment Blank	NBA-432	11/11/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-410	11/18/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-414	11/19/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-418	11/23/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-422	12/08/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-429	11/11/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-443	11/16/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-476	11/04/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-480	11/05/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-484	11/10/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-487	11/10/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-496	11/12/1992	N	N	N	N	N	<2	<1	<1
Trip Blank	NBA-500	11/16/1992	N	N	N	N	N	<2	<1	<1

[a]CAS Number 10544-50-0 Sulfur, mol. (S8)
CAS Number 67-64-1 Acetone
CAS Number 2605-67-6 Acetic acid, (triphenylphosp)
CAS Number 629-97-0 Docosane
CAS Number 630-02-4 Octacosane
CAS Number 117-81-7 Bis(2-ethylhexyl)phthalate
CAS Number 67-66-3 Chloroform
CAS Number 75-27-4 Bromodichloromethane

[b]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). An "N" indicates that the constituent was not observed.

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]TCL constituent.

[f]Volatile compound.

Table A-17 (continued). Volatile and Semivolatile Organic Constituents Observed in Samples Collected from Ground Water At and Near the MMTS, November 4 through December 9, 1992[a,b]

Sample Location	Ticket Number	Sample Date	78-51-3[c,d] (µg/L)	791-28-6[c,d] (µg/L)	84-74-2[c,e] (µg/L)	85-68-7[c,e] (µg/L)	UNK-11.80[c,d] (µg/L)	UNK-15.15[c,d] (µg/L)	UNK-16.15[c,d] (µg/L)	UNK-27.07[c,d] (µg/L)
Ground Water										
31SW91-14	NBA-408	11/17/1992	N	N	<10	<10	N	N	N	~2.0
31SW91-23	NBA-415	11/19/1992	N	N	<10	<10	N	N	N	N
82-07	NBA-478	11/04/1992	N	N	<10	<10	N	N	N	N
82-30B	NBA-412	11/18/1992	N	N	<10	<10	N	N	N	N
82-31B-W	NBA-494	11/11/1992	N	~11	<10	<10	N	N	N	N
82-36A	NBA-409	11/17/1992	N	N	<10	<10	~2.0	N	~4.0	N
82-40A	NBA-495	11/12/1992	N	N	<10	<10	N	N	N	N
82-42	NBA-416	11/19/1992	N	N	<10	<10	N	N	N	N
83-70	NBA-406	11/17/1992	N	N	N	N	N	N	N	N
83-70 (Dup)	NBA-407	11/17/1992	N	N	N	N	N	N	N	N
84-74	NBA-477	11/04/1992	N	N	N	N	N	N	N	N
84-75	NBA-423	12/09/1992	N	N	<10	<10	N	N	N	N
84-76	NBA-413	11/18/1992	N	N	<10	<10	N	N	N	N
84-77	NBA-490	11/11/1992	N	N	<10	<10	N	N	N	N
88-85	NBA-481	11/05/1992	N	N	<10	<10	N	N	N	N
92-01	NBA-497	11/12/1992	N	N	<10	<10	N	N	N	N
92-02	NBA-421	12/09/1992	N	N	<10	<10	N	N	N	N
92-03	NBA-440	11/12/1992	~6.0	N	~1	~3	N	N	N	N
92-04	NBA-417	11/19/1992	N	N	<10	<10	N	N	N	N
92-05	NBA-498	11/12/1992	N	N	N	N	N	N	N	N
92-06	NBA-419	11/23/1992	N	N	<10	<10	N	N	N	N
92-07	NBA-482	11/05/1992	N	N	<10	<10	N	N	N	N
92-08	NBA-483	11/05/1992	N	N	<10	<10	N	N	N	N
92-09	NBA-485	11/10/1992	N	N	<10	<10	N	N	N	N
92-10	NBA-405	11/16/1992	N	N	N	N	N	N	N	N
92-11	NBA-488	11/10/1992	N	N	<10	<10	N	N	N	N
92-11 (Dup)	NBA-489	11/10/1992	N	N	<10	<10	N	N	N	N

[a]CAS Number 78-51-3 Ethanol, 2-butoxy-,phosphate
CAS Number 791-28-6 Phosphine oxide, triphenyl-
CAS Number 84-74-2 Di-n-butylphthalate
CAS Number 85-68-7 Butyl benzyl phthalate
CAS Number UNK-11.80 Unknown
CAS Number UNK-15.15 Unknown
CAS Number UNK-16.15 Unknown
CAS Number UNK-27.07 Unknown

[b]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). An "N" indicates that the constituent was not observed.

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]TCL constituent.

Table A-17 (continued). Volatile and Semivolatile Organic Constituents Observed in Samples Collected from Ground Water At and Near the MMTS, November 4 through December 9, 1992[a,b]

Sample Location	Ticket Number	Sample Date	78-51-3[c,d] (µg/L)	791-28-6[c,d] (µg/L)	84-74-2[c,e] (µg/L)	85-68-7[c,e] (µg/L)	UNK-11.80[c,d] (µg/L)	UNK-15.15[c,d] (µg/L)	UNK-16.15[c,d] (µg/L)	UNK-27.07[c,d] (µg/L)
Surface Water										
Carbonate Seep	NBA-431	11/11/1992	N	N	<20	<20	N	N	N	N
Montezuma Canyon	NBA-441	11/15/1992	N	N	N	N	N	N	N	N
North Drainage	NBA-430	11/11/1992	N	N	<20	<20	N	~6.0	N	N
SW92-01	NBA-436	11/16/1992	N	N	~1	<10	N	N	N	~2.0
SW92-01 (Dup)	NBA-437	11/16/1992	N	N	N	N	N	N	N	N
SW92-02	NBA-438	11/17/1992	N	N	<10	<10	N	N	N	N
SW92-04	NBA-442	11/16/1992	N	N	<10	<10	N	N	N	~3.0
SW92-05	NBA-444	11/16/1992	N	N	<10	<10	N	N	N	~2.0
SW92-06	NBA-427	11/10/1992	N	N	N	N	N	N	N	N
SW92-07	NBA-445	11/17/1992	N	N	N	N	N	N	N	N
SW92-08	NBA-446	11/17/1992	N	N	N	N	N	N	N	N
SW92-09	NBA-447	11/17/1992	N	N	N	N	N	N	N	N
SW92-10	NBA-439	11/12/1992	N	N	N	N	N	N	N	N
Sorenson	NBA-426	11/10/1992	N	N	N	N	N	N	N	N
W-2	NBA-433	11/11/1992	N	N	<10	<10	N	N	N	N
W-2 (Dup)	NBA-434	11/11/1992	N	N	<10	<10	N	N	N	N
W-4	NBA-428	11/10/1992	N	N	N	N	N	N	N	N
QA/QC										
Equipment Blank	NBA-411	11/18/1992	N	N	<10	<10	N	N	N	N
Equipment Blank	NBA-432	11/11/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-410	11/18/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-414	11/19/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-418	11/23/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-422	12/08/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-429	11/11/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-443	11/16/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-476	11/04/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-480	11/05/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-484	11/10/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-487	11/10/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-496	11/12/1992	N	N	N	N	N	N	N	N
Trip Blank	NBA-500	11/16/1992	N	N	N	N	N	N	N	N

[a]CAS Number 78-51-3 Ethanol, 2-butoxy-,phosphate
CAS Number 791-28-6 Phosphine oxide, triphenyl-
CAS Number 84-74-2 Di-n-butylphthalate
CAS Number 85-68-7 Butyl benzyl phthalate
CAS Number UNK-11.80 Unknown
CAS Number UNK-15.15 Unknown
CAS Number UNK-16.15 Unknown
CAS Number UNK-27.07 Unknown

[b]A "<" indicates that the maximum concentration was below detection limits (number shown is detection limit). A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). An "N" indicates that the constituent was not observed.

[c]Semivolatile compound.

[d]Tentatively identified compound.

[e]TCL constituent.

Table A-17 (continued). Volatile and Semivolatile Organic Constituents Observed in Samples Collected from Ground Water At and Near the MMTS, November 4 through December 9, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-27.16[c,d] (µg/L)	UNK-27.36[c,d] (µg/L)	UNK-27.37[c,d] (µg/L)	UNK-27.39[c,d] (µg/L)	UNK-28.76[c,d] (µg/L)	UNK-3.75[c,d] (µg/L)	UNK-31.22[c,d] (µg/L)
Ground Water									
31SW91-14	NBA-408	11/17/1992	N	N	N	N	N	N	N
31SW91-23	NBA-415	11/19/1992	N	N	~4.0	N	N	N	N
82-07	NBA-478	11/04/1992	N	N	N	N	N	N	N
82-30B	NBA-412	11/18/1992	N	N	N	N	N	N	N
82-31B-W	NBA-494	11/11/1992	N	N	N	N	N	N	N
82-36A	NBA-409	11/17/1992	N	N	N	N	N	N	N
82-40A	NBA-495	11/12/1992	N	N	N	N	N	N	N
82-42	NBA-416	11/19/1992	N	N	~4.0	N	N	N	N
83-70	NBA-406	11/17/1992	N	N	N	N	N	N	N
83-70 (Dup)	NBA-407	11/17/1992	N	N	N	N	N	N	N
84-74	NBA-477	11/04/1992	N	N	N	N	N	N	N
84-75	NBA-423	12/09/1992	N	N	~2	N	N	N	N
84-76	NBA-413	11/18/1992	N	N	N	N	N	N	N
84-77	NBA-490	11/11/1992	N	N	N	N	N	N	N
88-85	NBA-481	11/05/1992	N	N	N	N	N	N	N
92-01	NBA-497	11/12/1992	N	N	N	N	N	N	N
92-02	NBA-421	12/09/1992	N	~3	N	N	N	N	N
92-03	NBA-440	11/12/1992	N	N	N	N	N	N	N
92-04	NBA-417	11/19/1992	N	N	~3.0	N	N	N	N
92-05	NBA-498	11/12/1992	N	N	N	N	N	N	N
92-06	NBA-419	11/23/1992	N	N	N	N	N	N	N
92-07	NBA-482	11/05/1992	N	N	N	N	~6.0	~3.0	~3.0
92-08	NBA-483	11/05/1992	N	N	N	N	N	N	N
92-09	NBA-485	11/10/1992	N	N	N	N	N	N	N
92-10	NBA-405	11/16/1992	N	N	N	N	N	N	N
92-11	NBA-488	11/10/1992	N	N	N	N	N	N	N
92-11 (Dup)	NBA-489	11/10/1992	N	N	N	N	N	N	N

[a]CAS Number UNK-27.16 Unknown
CAS Number UNK-27.36 Unknown
CAS Number UNK-27.37 Unknown
CAS Number UNK-27.39 Unknown
CAS Number UNK-28.76 Unknown phthalate
CAS Number UNK-3.75 Unknown
CAS Number UNK-31.22 Unknown phthalate

[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). An "N" indicates that the constituent was not observed.

[c]Semivolatile compound.

[d]Tentatively identified compound.

Table A-17 (continued). Volatile and Semivolatile Organic Constituents Observed in Samples Collected from Ground Water At and Near the MMTS, November 4 through December 9, 1992[a,b]

Sample Location	Ticket Number	Sample Date	UNK-27.16[c,d] (µg/L)	UNK-27.36[c,d] (µg/L)	UNK-27.37[c,d] (µg/L)	UNK-27.39[c,d] (µg/L)	UNK-28.76[c,d] (µg/L)	UNK-3.75[c,d] (µg/L)	UNK-31.22[c,d] (µg/L)
Surface Water									
Carbonate Seep	NBA-431	11/11/1992	N	N	N	N	N	N	N
Montezuma Canyon	NBA-441	11/15/1992	N	N	N	N	N	N	N
North Drainage	NBA-430	11/11/1992	N	N	N	N	N	N	N
SW92-01	NBA-436	11/16/1992	N	N	N	N	N	N	N
SW92-01 (Dup)	NBA-437	11/16/1992	N	N	N	N	N	N	N
SW92-02	NBA-438	11/17/1992	N	N	N	~4.0	N	N	N
SW92-04	NBA-442	11/16/1992	N	N	N	N	N	N	N
SW92-05	NBA-444	11/16/1992	N	N	N	N	N	N	N
SW92-06	NBA-427	11/10/1992	N	N	N	N	N	N	N
SW92-07	NBA-445	11/17/1992	N	N	N	N	N	N	N
SW92-08	NBA-446	11/17/1992	N	N	N	N	N	N	N
SW92-09	NBA-447	11/17/1992	N	N	N	N	N	N	N
SW92-10	NBA-439	11/12/1992	N	N	N	N	N	N	N
Sorenson	NBA-426	11/10/1992	N	N	N	N	N	N	N
W-2	NBA-433	11/11/1992	~2.0	N	N	N	N	N	N
W-2 (Dup)	NBA-434	11/11/1992	N	N	N	N	N	N	N
W-4	NBA-428	11/10/1992	N	N	N	N	N	N	N
QA/QC									
Equipment Blank	NBA-411	11/18/1992	N	N	N	N	N	N	N
Equipment Blank	NBA-432	11/11/1992	N	N	N	N	N	N	N
Trip Blank	NBA-410	11/18/1992	N	N	N	N	N	N	N
Trip Blank	NBA-414	11/19/1992	N	N	N	N	N	N	N
Trip Blank	NBA-418	11/23/1992	N	N	N	N	N	N	N
Trip Blank	NBA-422	12/08/1992	N	N	N	N	N	N	N
Trip Blank	NBA-429	11/11/1992	N	N	N	N	N	N	N
Trip Blank	NBA-443	11/16/1992	N	N	N	N	N	N	N
Trip Blank	NBA-476	11/04/1992	N	N	N	N	N	N	N
Trip Blank	NBA-480	11/05/1992	N	N	N	N	N	N	N
Trip Blank	NBA-484	11/10/1992	N	N	N	N	N	N	N
Trip Blank	NBA-487	11/10/1992	N	N	N	N	N	N	N
Trip Blank	NBA-496	11/12/1992	N	N	N	N	N	N	N
Trip Blank	NBA-500	11/16/1992	N	N	N	N	N	N	N

[a]CAS Number UNK-27.16 Unknown
CAS Number UNK-27.36 Unknown
CAS Number UNK-27.37 Unknown
CAS Number UNK-27.39 Unknown
CAS Number UNK-28.76 Unknown phthalate
CAS Number UNK-3.75 Unknown
CAS Number UNK-31.22 Unknown phthalate

[b]A "~" indicates an approximate value (the value was outside the limits for which the instrument was calibrated). An "N" indicates that the constituent was not observed.

[c]Semivolatile compound.

[d]Tentatively identified compound.

Table A-18. Target Compound List of Organic Constituents Included in Analysis of Ground Water at the MMTS

CAS Number	Constituent	Reporting Limit (μg/L)
Volatile Organics		
71-55-6	1,1,1-Trichloroethane	1
79-34-5	1,1,2,2-Tetrachloroethane	1
79-00-5	1,1,2-Trichloroethane	1
75-34-3	1,1-Dichloroethane	1
75-35-4	1,1-Dichloroethene	1
107-06-2	1,2-Dichloroethane	1
78-87-5	1,2-Dichloropropane	1
78-93-3	2-Butanone	2
591-78-6	2-Hexanone	2
108-10-1	4-Methyl-2-pentanone	2
67-64-1	Acetone	2
71-43-2	Benzene	1
75-27-4	Bromodichloromethane	1
75-25-2	Bromoform	1
74-83-9	Bromomethane	2
75-15-0	Carbon disulfide	1
56-23-5	Carbon tetrachloride	1
108-90-7	Chlorobenzene	1
75-00-3	Chloroethane	2
67-66-3	Chloroform	1
74-87-3	Chloromethane	2
10061-01-5	*cis*-1,3-Dichloropropene	1
124-48-1	Dibromochloromethane	1
100-41-4	Ethyl benzene	1
75-09-2	Methylene chloride	1
100-42-5	Styrene	1
127-18-4	Tetrachloroethene	1
108-88-3	Toluene	1
156-60-5	*trans*-1,2-Dichloroethene	1
10061-02-6	*trans*-1,3-Dichloropropene	1
79-01-6	Trichloroethene	1
108-05-4	Vinyl acetate	2
75-01-4	Vinyl chloride	2
1330-20-7	Xylenes (total)	1

Table 18 (continued). Target Compound List of Organic Constituents Included in Analysis of Ground Water at the MMTS

CAS Number	Constituent	Reporting Limit (µg/L)
Herbicides		
93-76-5	2,4,5-T	0.20
93-72-1	2,4,5-TP (Silvex)	0.17
94-75-7	2,4-D	1.2
94-82-6	2,4-DB	0.91
75-99-0	Dalapon	5.8
120-36-5	Dichloroprop	0.65
Pesticides		
72-54-8	4,4'-DDD	0.10
72-55-9	4,4'-DDE	0.10
50-29-3	4,4'-DDT	0.10
309-00-2	Aldrin	0.05
319-84-6	alpha-BHC	0.05
5103-71-9	alpha-Chlordane	0.05
12674-11-2	Aroclor-1016	0.5
11104-28-2	Aroclor-1221	0.5
11141-16-5	Aroclor-1232	0.5
53469-21-9	Aroclor-1242	0.5
12672-29-6	Aroclor-1248	0.5
11097-69-1	Aroclor-1254	1.0
11096-82-5	Aroclor-1260	1.0
319-85-7	beta-BHC	0.05
319-86-8	delta-BHC	0.05
60-57-1	Dieldrin	0.10
959-98-8	Endosulfan I	0.05
33213-65-9	Endosulfan II	0.10
1031-07-8	Endosulfan sulfate	0.10
72-20-8	Endrin	0.10
7421-93-4	Endrin aldehyde	0.10
58-89-9	gamma-BHC (Lindane)	0.05
5103-74-2	gamma-Chlordane	0.05
76-44-8	Heptachlor	0.05
1024-57-3	Heptachlor epoxide	0.05
72-43-5	Methoxychlor	0.5
8001-35-2	Toxaphene	1.0

Table 18 (continued). Target Compound List of Organic Constituents Included in Analysis of Ground Water at the MMTS

CAS Number	Constituent	Reporting Limit (µg/L)
Semivolatile Organics		
120-82-1	1,2,4-Trichlorobenzene	10
95-50-1	1,2-Dichlorobenzene	10
541-73-1	1,3-Dichlorobenzene	10
106-46-7	1,4-Dichlorobenzene	10
108-60-1	2,2-Oxybis(1-chloropropane)	10
95-95-4	2,4,5-Trichlorophenol	50
88-06-2	2,4,6-Trichlorophenol	10
120-83-2	2,4-Dichlorophenol	10
105-67-9	2,4-Dimethylphenol	10
51-28-5	2,4-Dinitrophenol	50
121-14-2	2,4-Dinitrotoluene	10
606-20-2	2,6-Dinitrotoluene	10
91-58-7	2-Chloronaphthalene	10
95-57-8	2-Chlorophenol	10
91-57-6	2-Methylnaphthalene	10
95-48-7	2-Methylphenol	10
88-74-4	2-Nitroaniline	50
88-75-5	2-Nitrophenol	10
91-94-1	3,3'-Dichlorobenzidine	20
99-09-2	3-Nitroaniline	50
534-52-1	4,6-Dinitro-2-methylphenol	50
101-55-3	4-Bromophenyl-phenylether	10
59-50-7	4-Chloro-3-methylphenol	10
106-47-8	4-Chloroaniline	10
7005-72-3	4-Chlorophenyl phenyl ether	10
106-44-5	4-Methylphenol	10
100-01-6	4-Nitroaniline	50
100-02-7	4-Nitrophenol	50
83-32-9	Acenaphthene	10
208-96-8	Acenaphthylene	10
120-12-7	Anthracene	10
56-55-3	Benzo(a)anthracene	10
50-32-8	Benzo(a)pyrene	10
205-99-2	Benzo(b)fluoranthene	10
191-24-2	Benzo(g,h,i)perylene	10
207-08-9	Benzo(k)fluoranthene	10
65-85-0	Benzoic acid	50
100-51-6	Benzyl alcohol	10
111-91-1	Bis(2-chloroethoxy)methane	10
111-44-4	Bis(2-chloroethyl)ether	10
117-81-7	Bis(2-ethylhexyl)phthalate	10
85-68-7	Butyl benzyl phthalate	10
218-01-9	Chrysene	10

Table 18 (continued). Target Compound List of Organic Constituents Included in Analysis of Ground Water at the MMTS

CAS Number	Constituent	Reporting Limit (µg/L)
Semivolatile Organics		
84-74-2	Di-n-butylphthalate	10
117-84-0	Di-n-octylphthalate	10
53-70-3	Dibenzo(a,h)anthracene	10
132-64-9	Dibenzofuran	10
84-66-2	Diethylphthalate	10
131-11-3	Dimethylphthalate	10
206-44-0	Fluoranthene	10
86-73-7	Fluorene	10
118-74-1	Hexachlorobenzene	10
87-68-3	Hexachlorobutadiene	10
77-47-4	Hexachlorocyclopentadiene	10
67-72-1	Hexachloroethane	10
193-39-5	Indeno(1,2,3-cd)pyrene	10
78-59-1	Isophorone	10
621-64-7	N-Nitroso-di-n-dipropylamine	10
86-30-6	N-Nitrosodiphenylamine	10
91-20-3	Naphthalene	10
98-95-3	Nitrobenzene	10
87-86-5	Pentachlorophenol	50
85-01-8	Phenanthrene	10
108-95-2	Phenol	10
129-00-0	Pyrene	10

APPENDIX B

TIME-CONCENTRATION GRAPHS

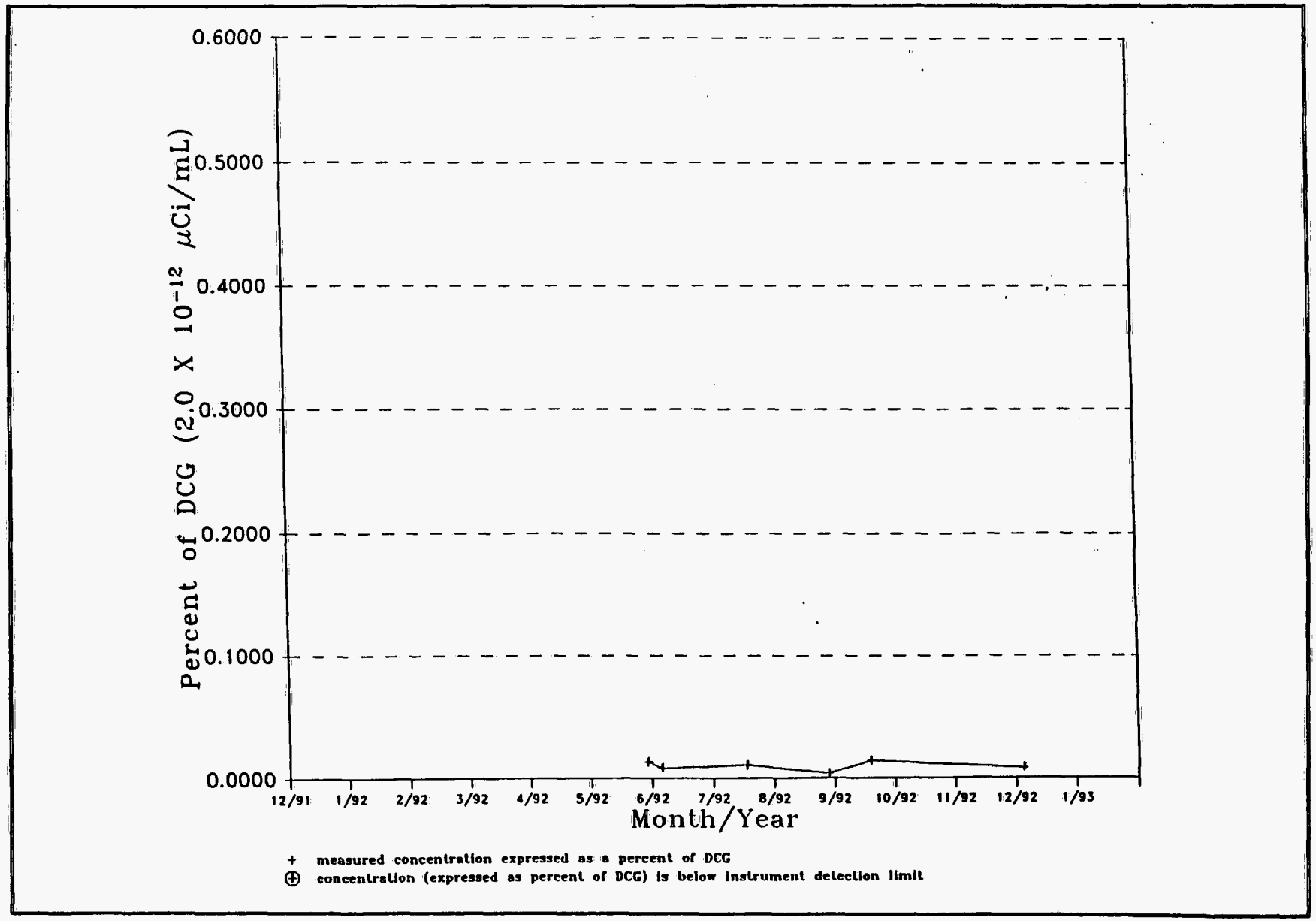

Figure B-1. Uranium Concentrations in Ambient Air as a Percentage of the DCG at Station AIR-M-4 from May through December 1992

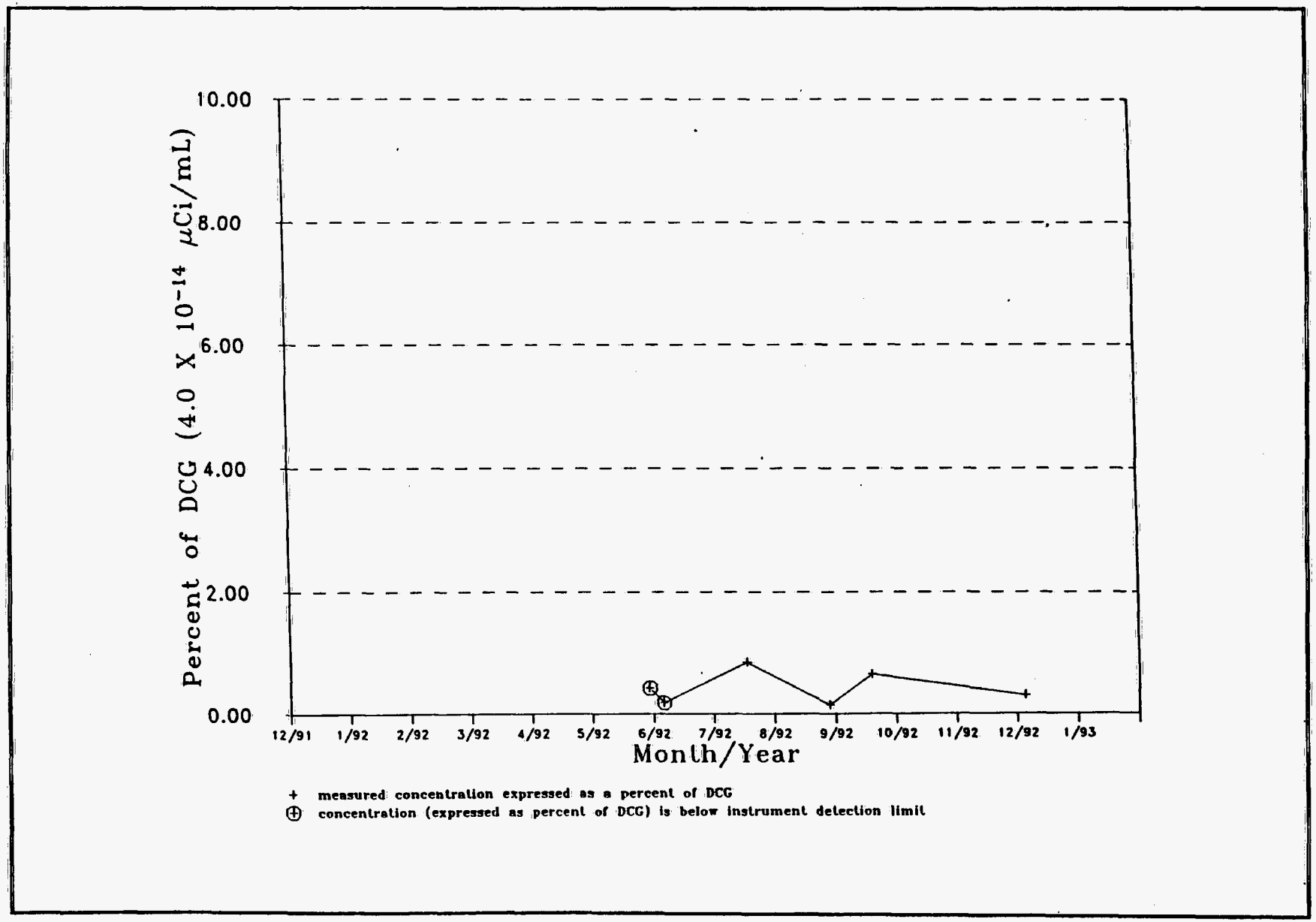

Figure B-2. Thorium-230 Concentrations in Ambient Air as a Percentage of the DCG at Station AIR-M-4 from May through December 1992

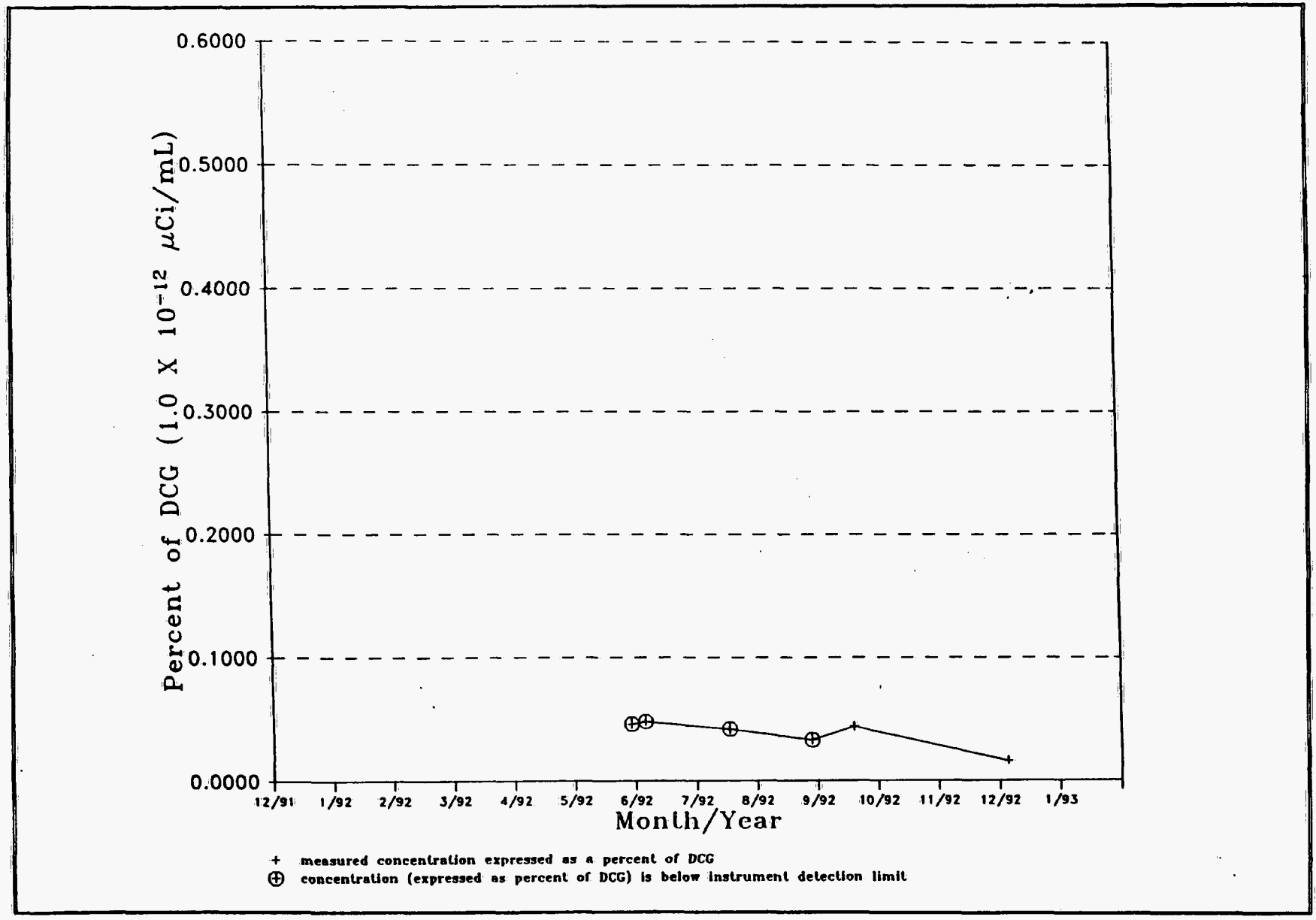

Figure B-3. Radium-226 Concentrations in Ambient Air as a Percentage of the DCG at Station AIR-M-4 from May through December 1992

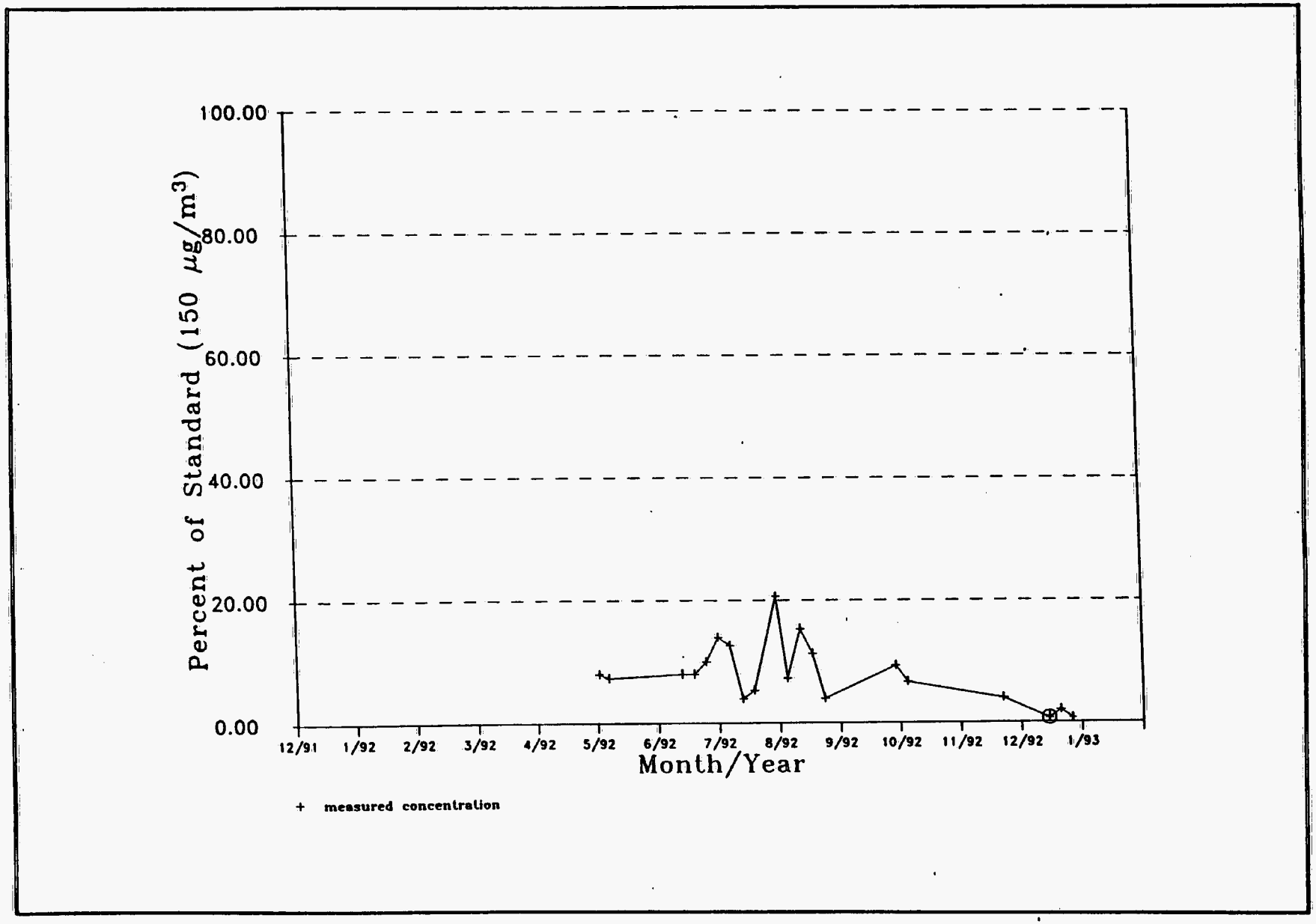

Figure B-4. PM_{10} Concentrations in Ambient Air as a Percentage of the EPA Standard at Station AIR-M-4 from May through December 1992

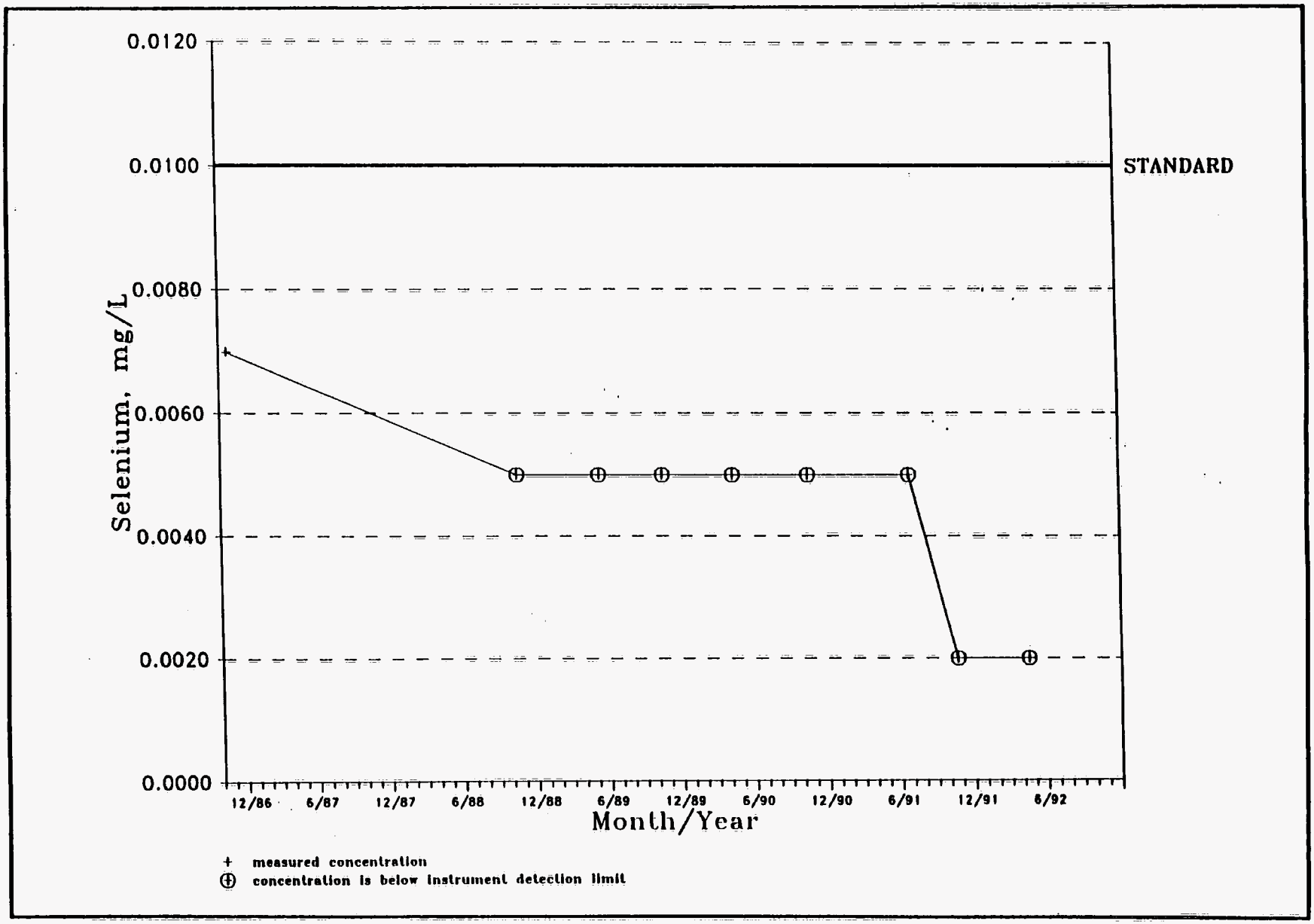

Figure B-5. Selenium Concentrations at W-5 (Upgradient) from October 1986 through April 1992

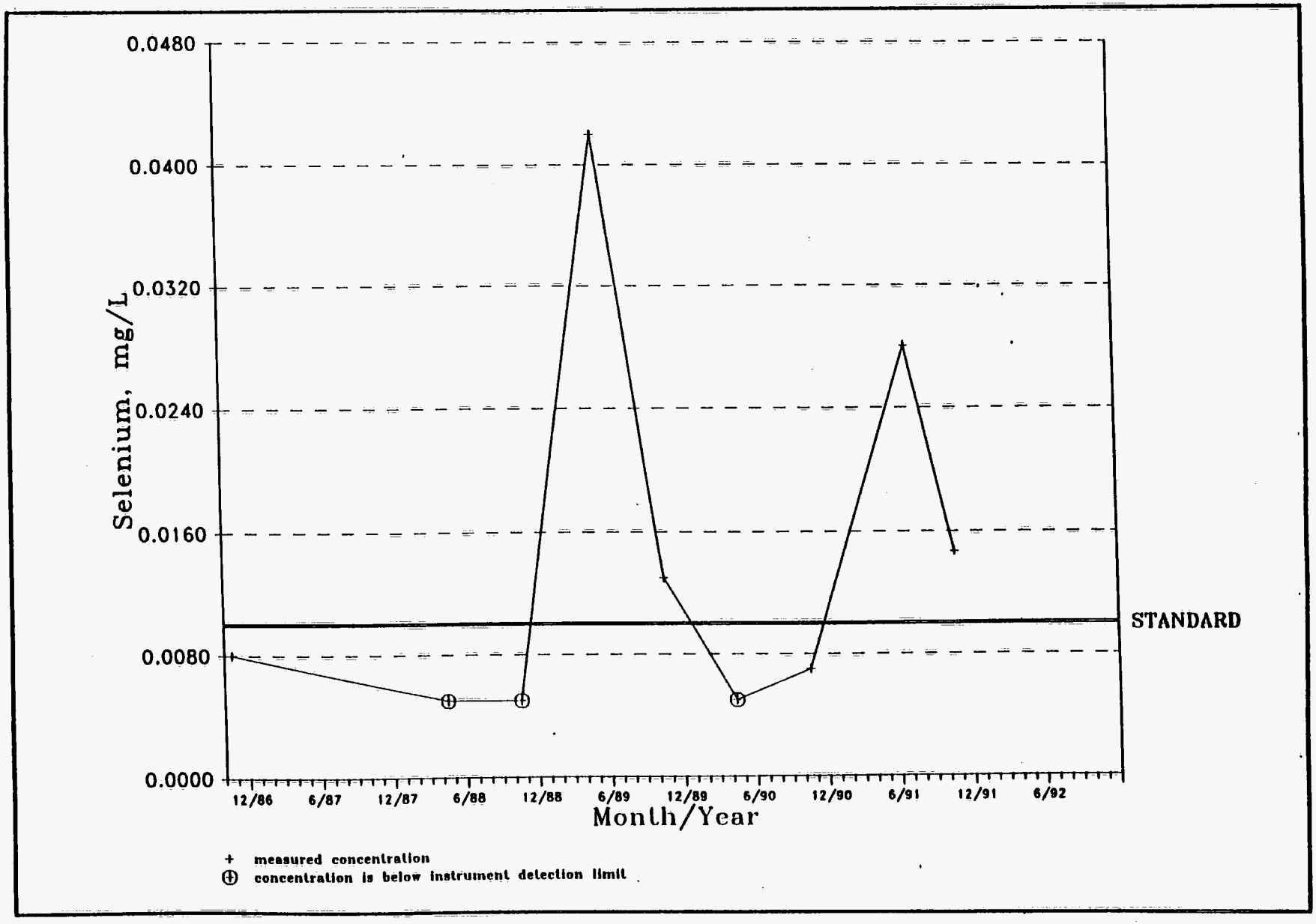

Figure B-6. Selenium Concentrations at W-4 (Downgradient) from October 1986 through December 1991

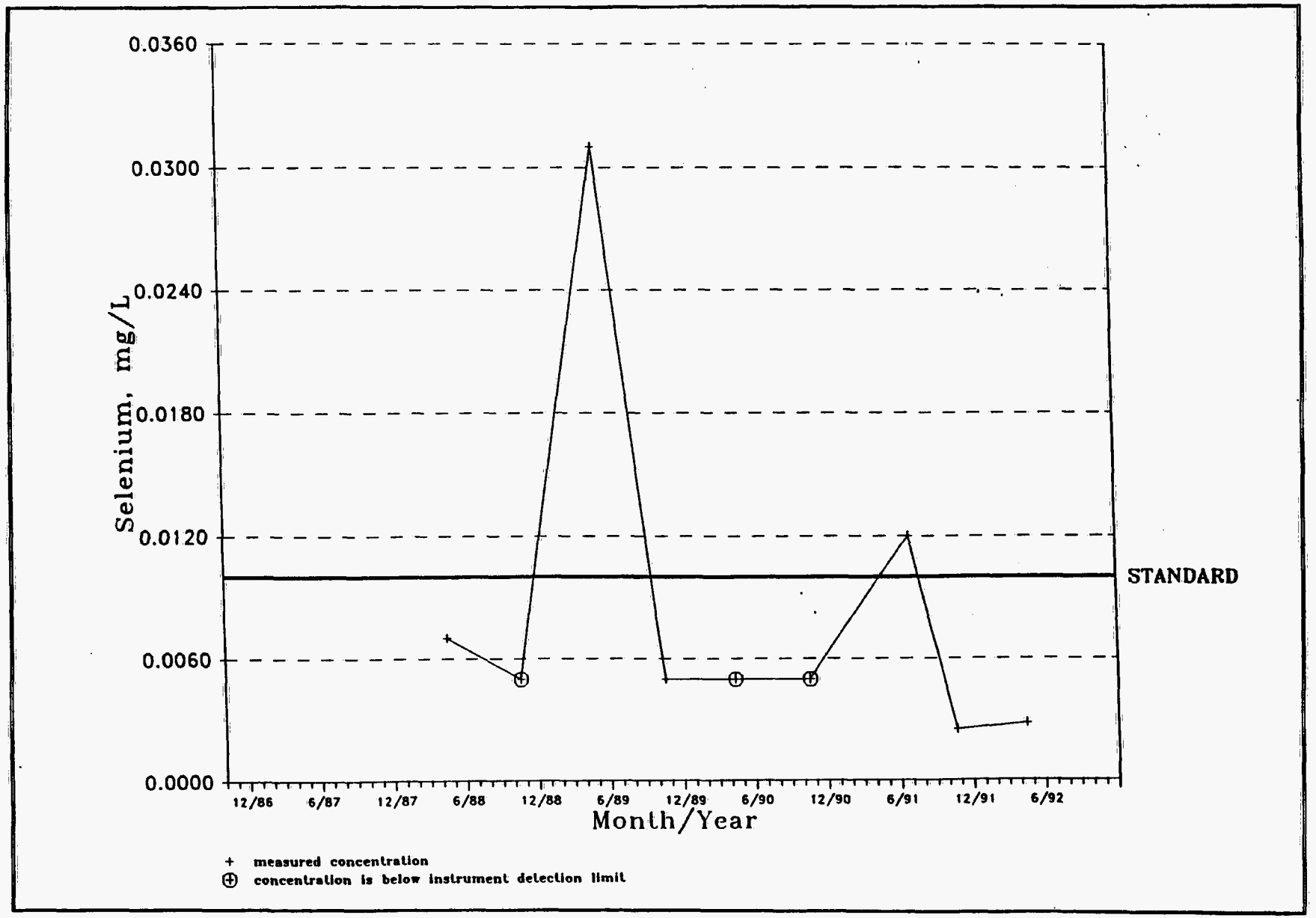

Figure B-7. Selenium Concentrations at Sorenson Site (Downgradient) from April 1988 through April 1992

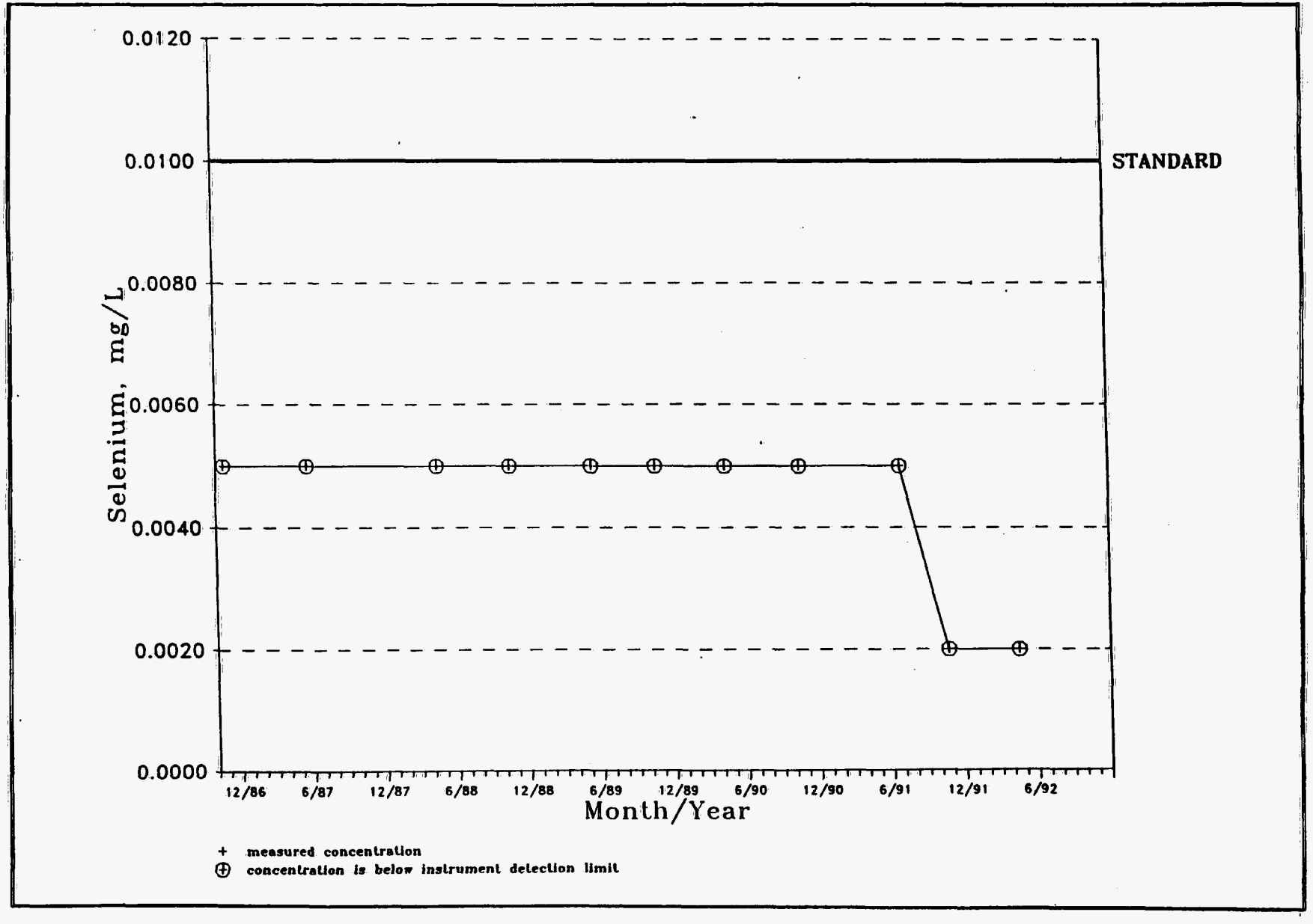

Figure B-8. Selenium Concentrations at Montezuma Canyon (Downgradient) from October 1986 through April 1992

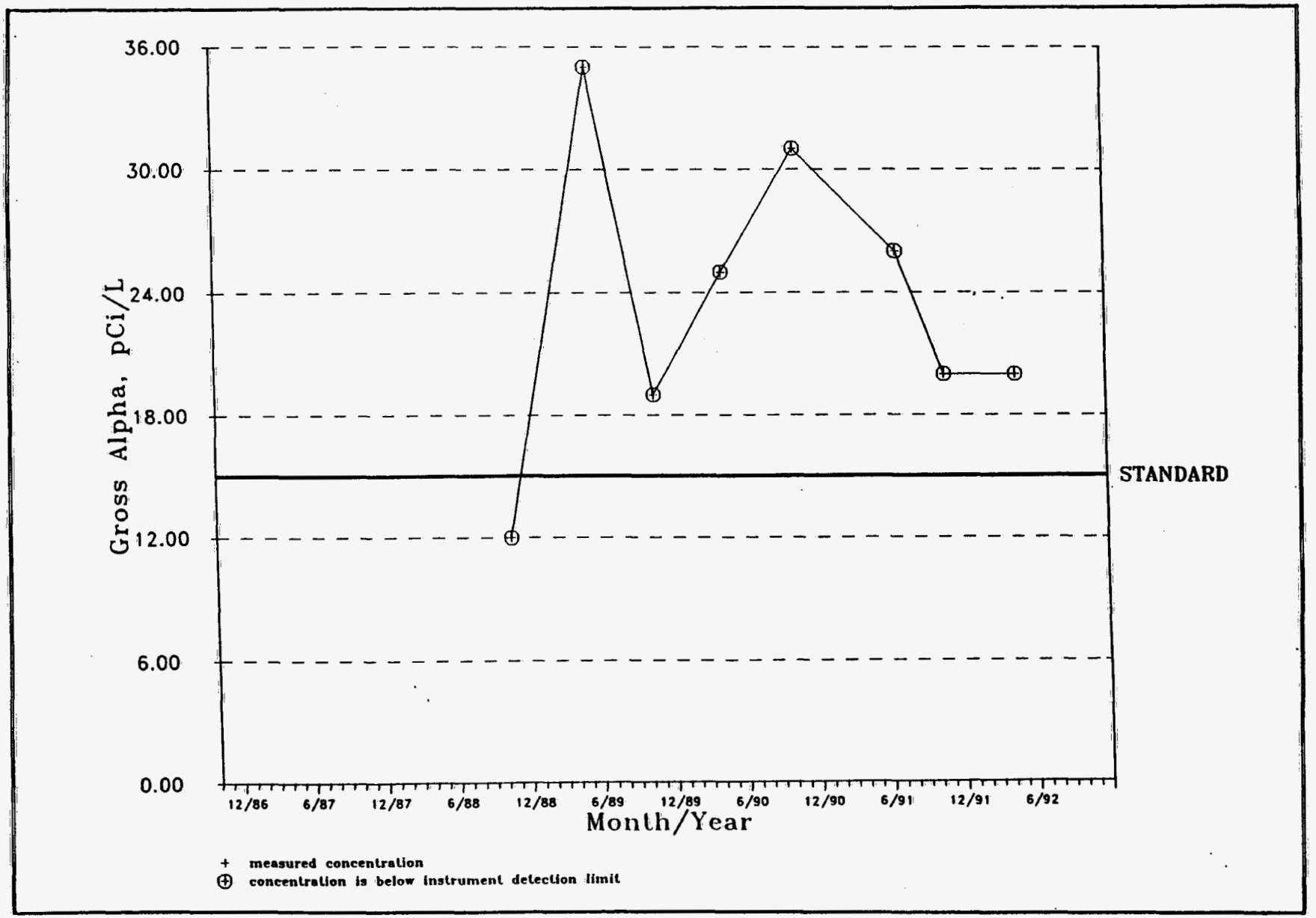

Figure B-9. Gross Alpha Concentrations at W-5 (Upgradient) from October 1988 through April 1992

Figure B-10. Gross Alpha Concentrations at W-4 (Downgradient) from April 1988 through December 1991

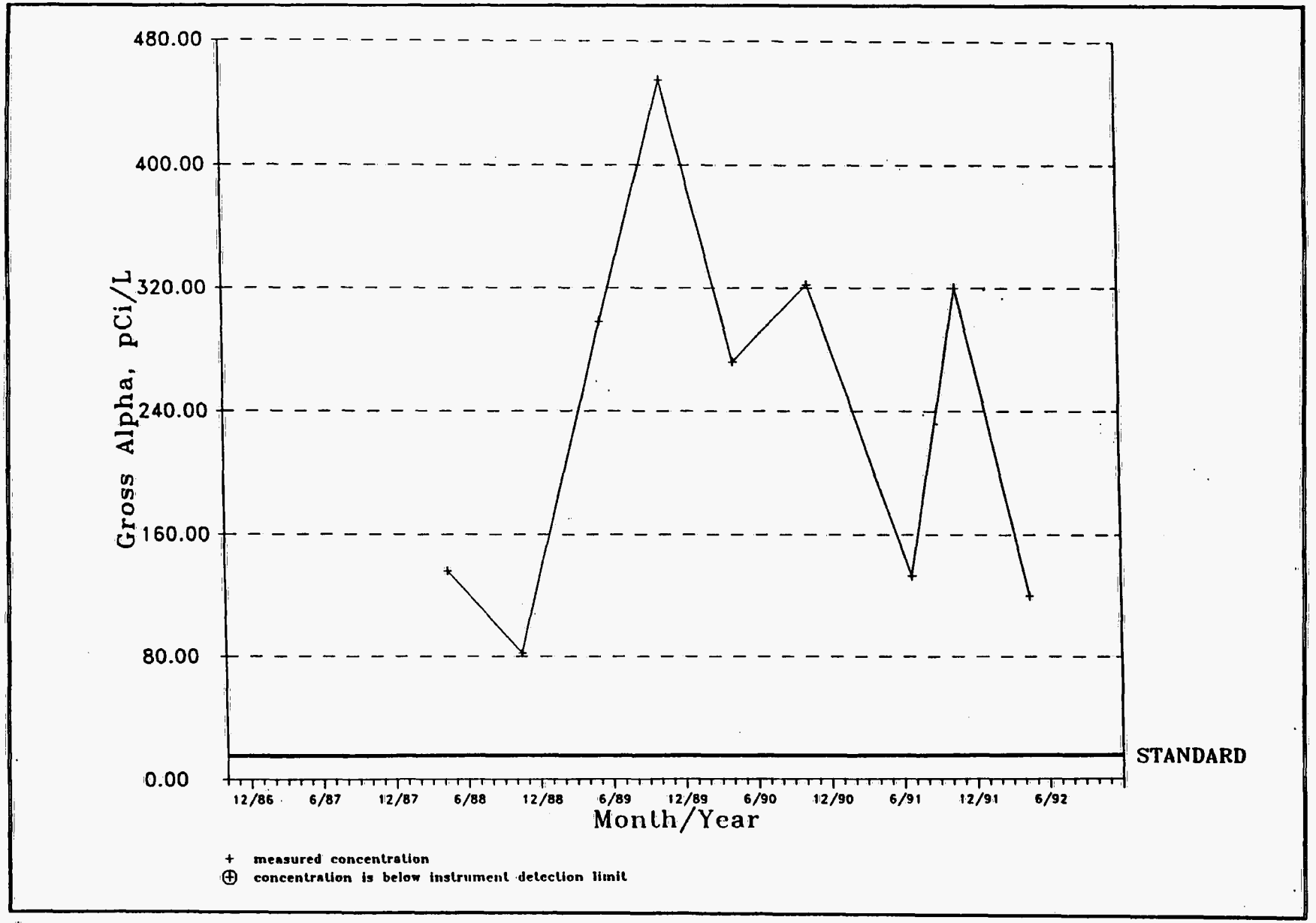

Figure B-11. Gross Alpha Concentrations at Sorenson Site (Downgradient) from April 1988 through April 1992

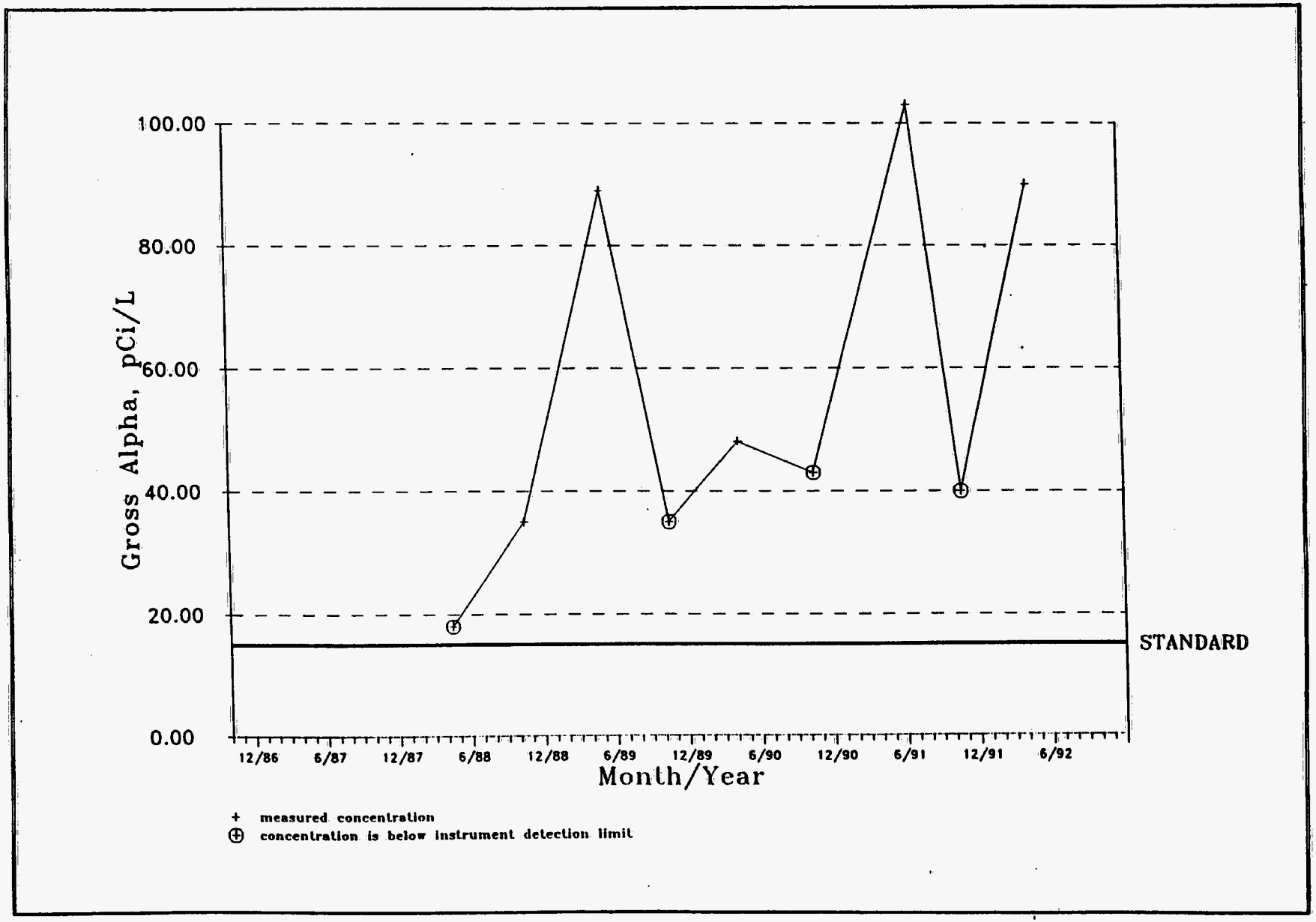

Figure B-12. Gross Alpha Concentrations at Montezuma Canyon (Downgradient) from April 1988 through April 1992

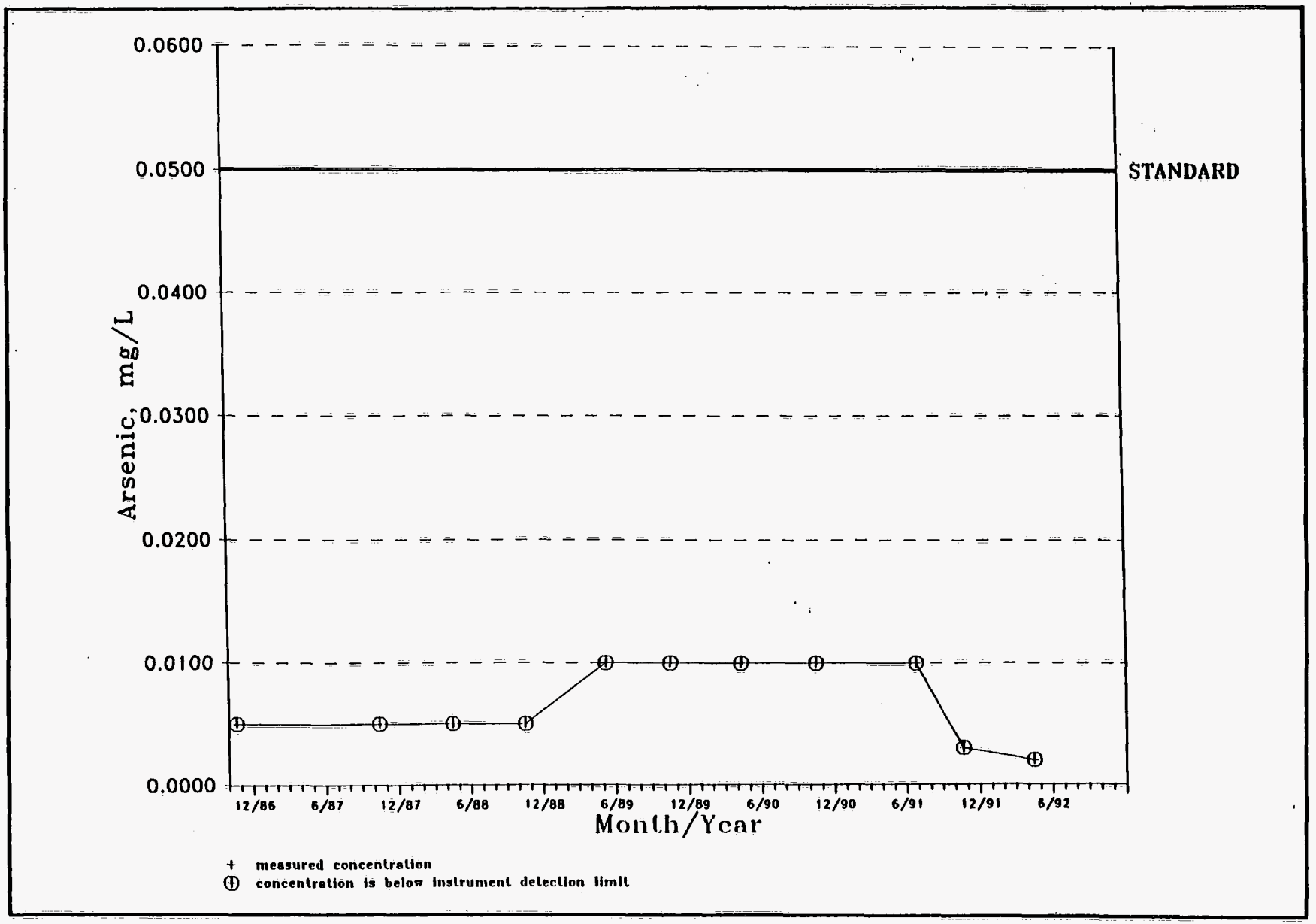

Figure B-13. Arsenic Concentrations in Well 82-20 from October 1986 through April 1992

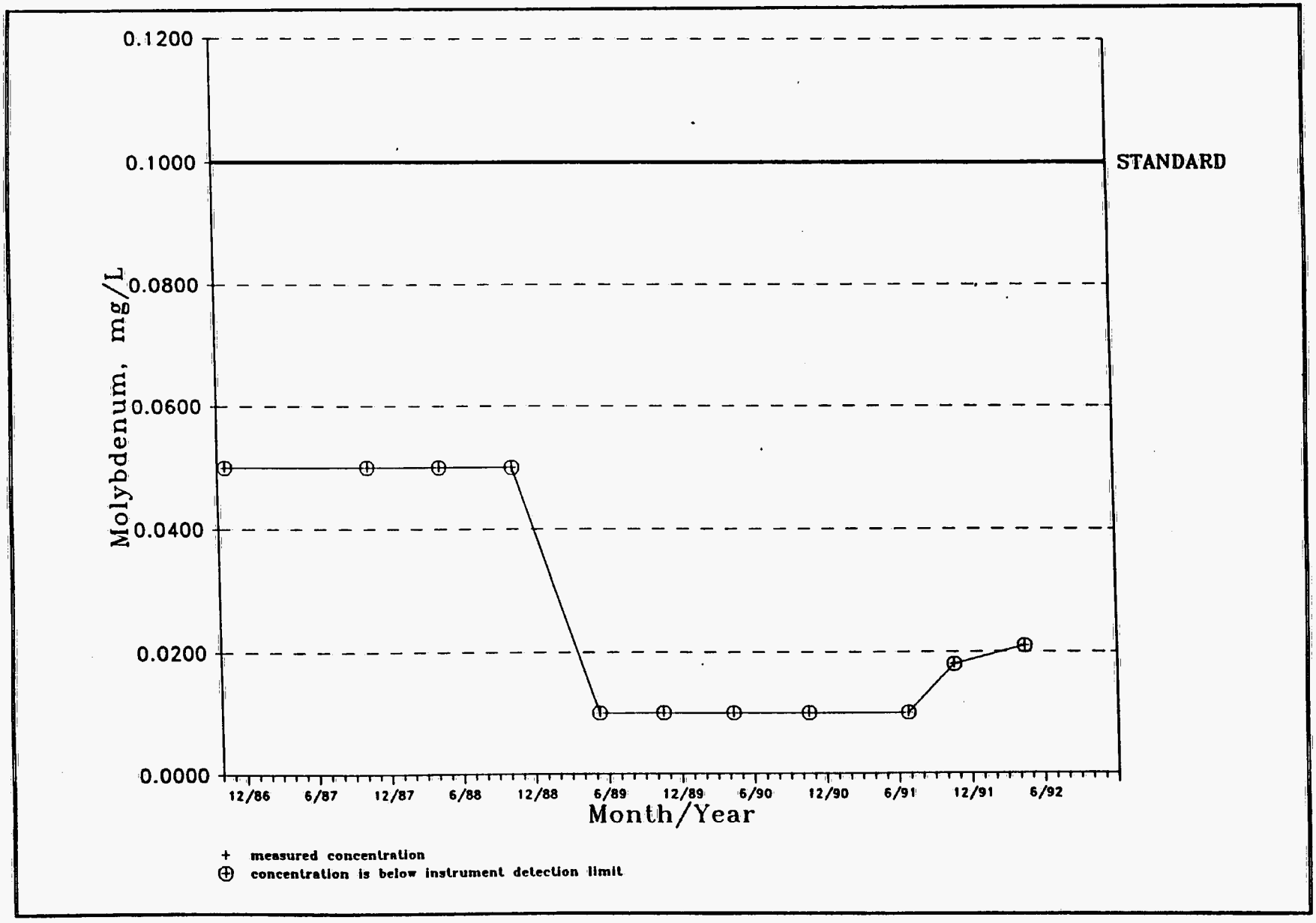

Figure B-14. Molybdenum Concentrations in Well 82-20 from October 1986 through April 1992

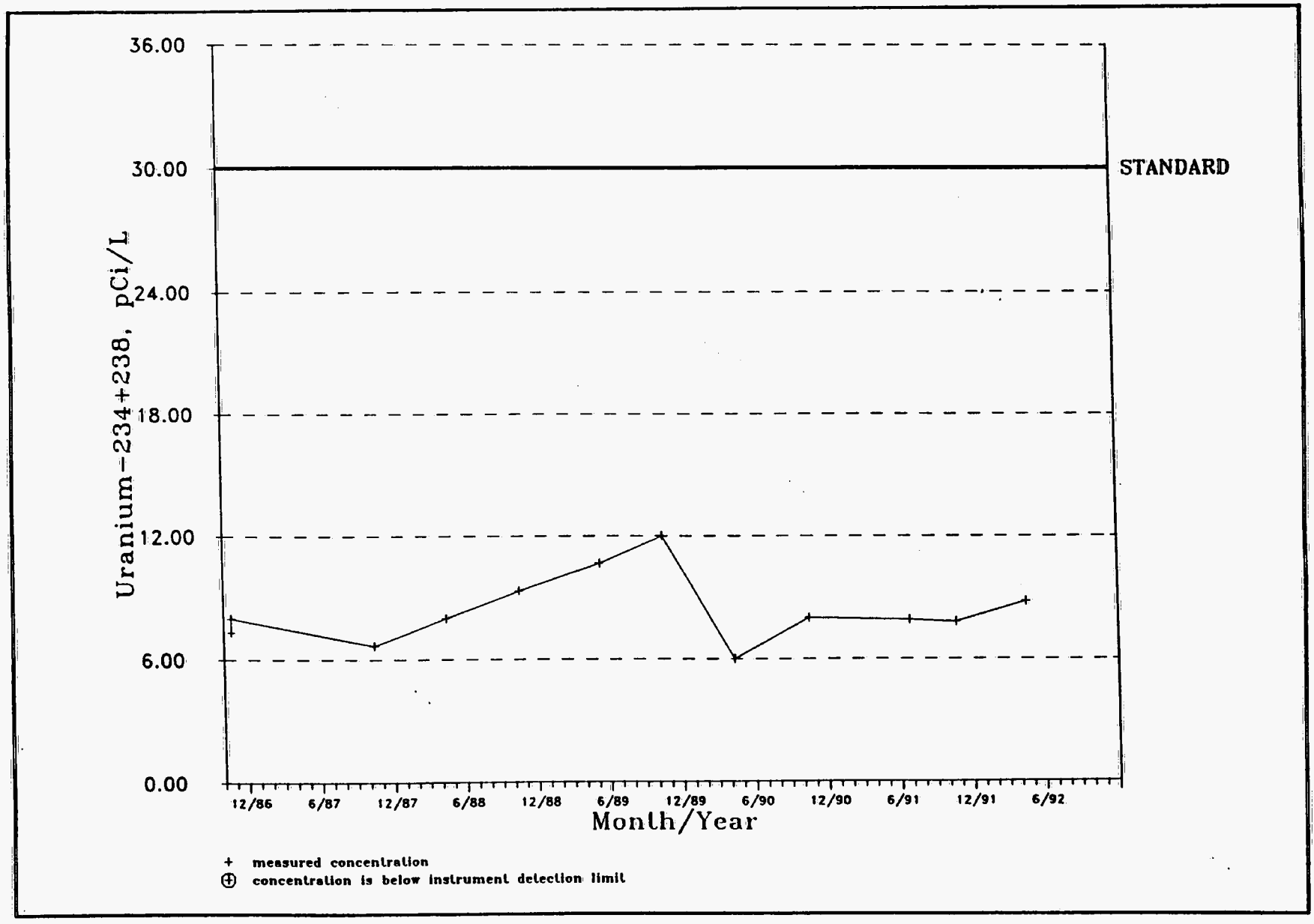

Figure B-15. Uranium-234+238 Concentrations in Well 82-20 from October 1986 through April 1992

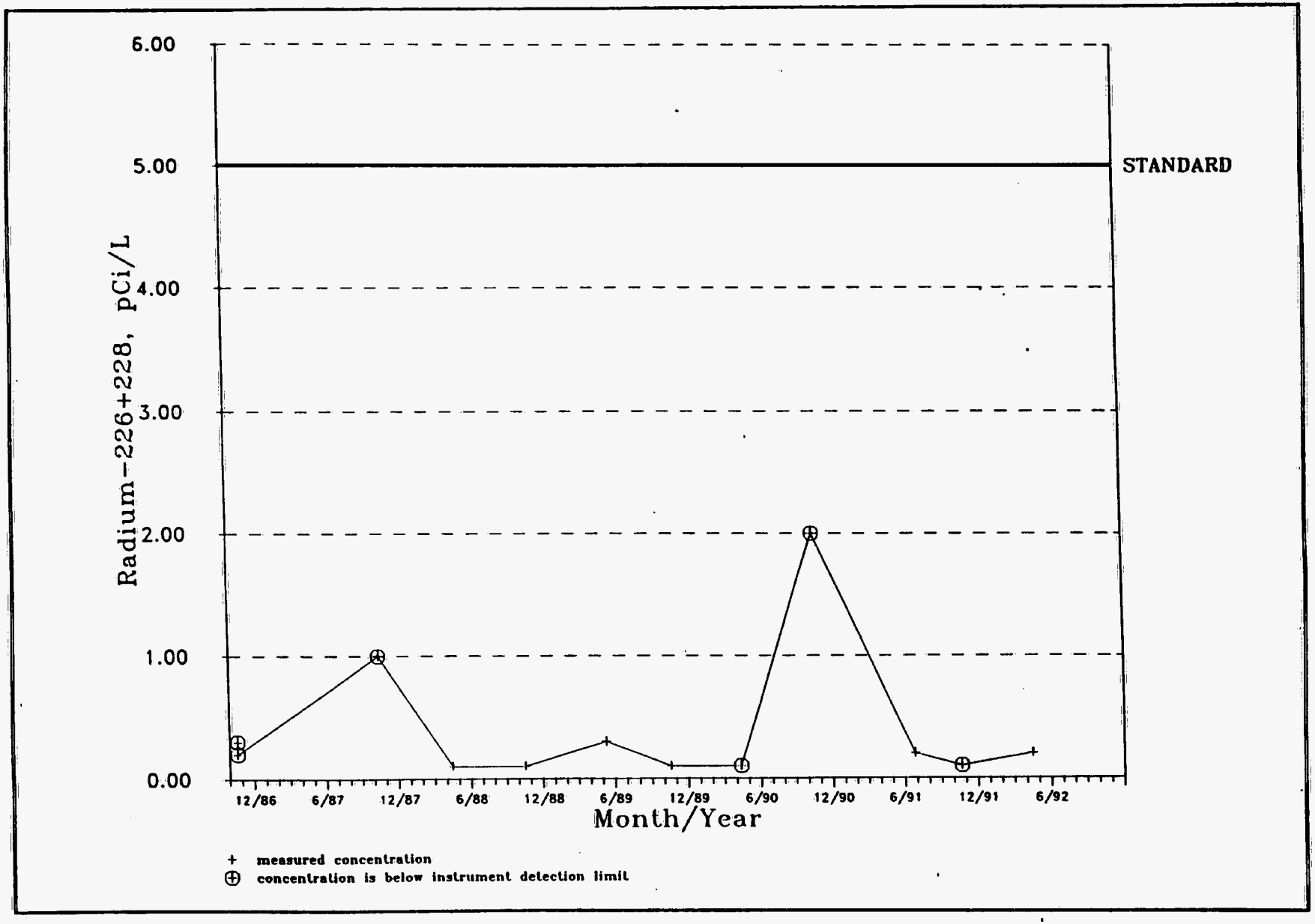

Figure B-16. Radium-226+228 Concentrations in Well 82-20 from October 1986 through April 1992

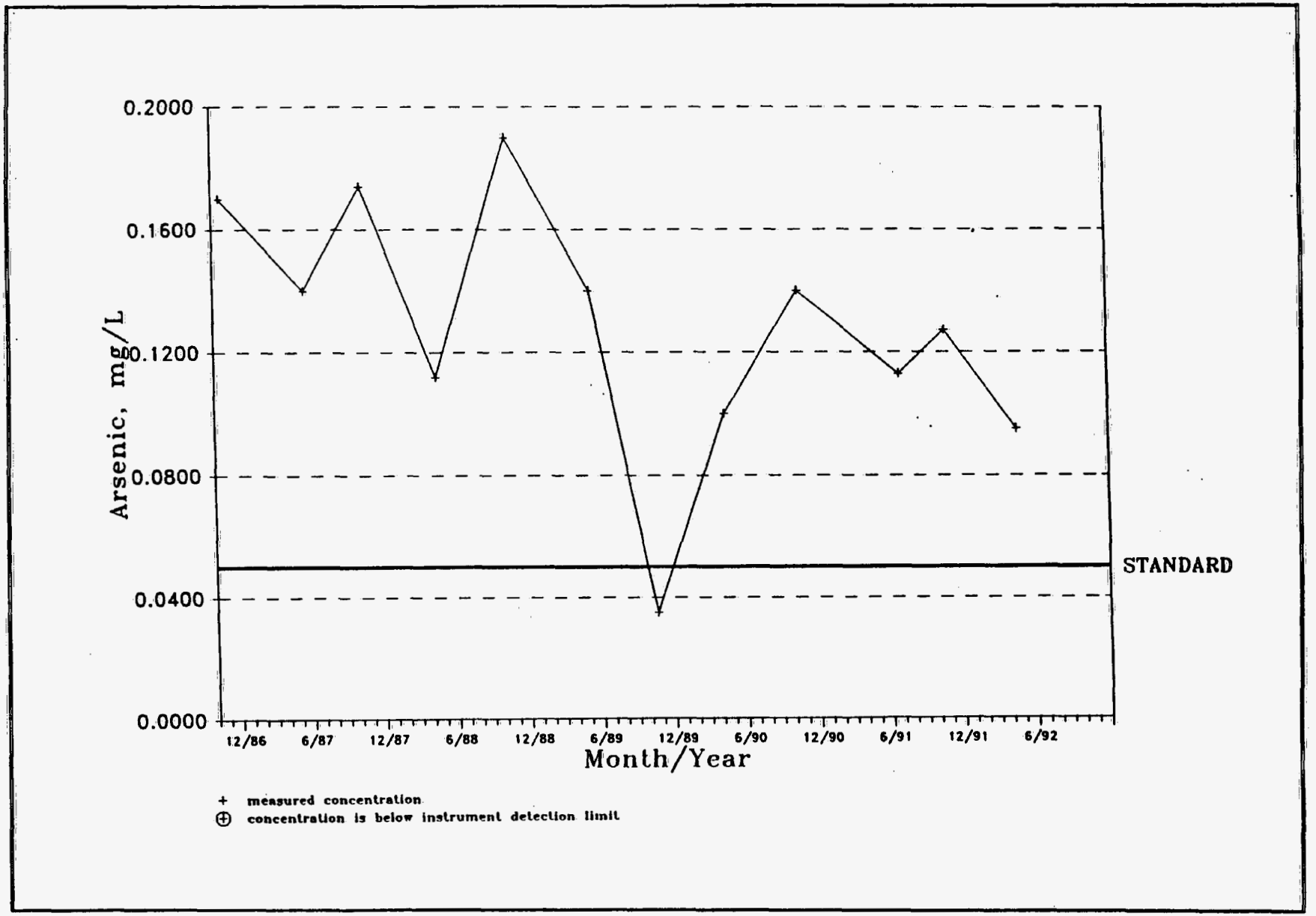

Figure B-17. Arsenic Concentrations in Well 82-30B from October 1986 through April 1992

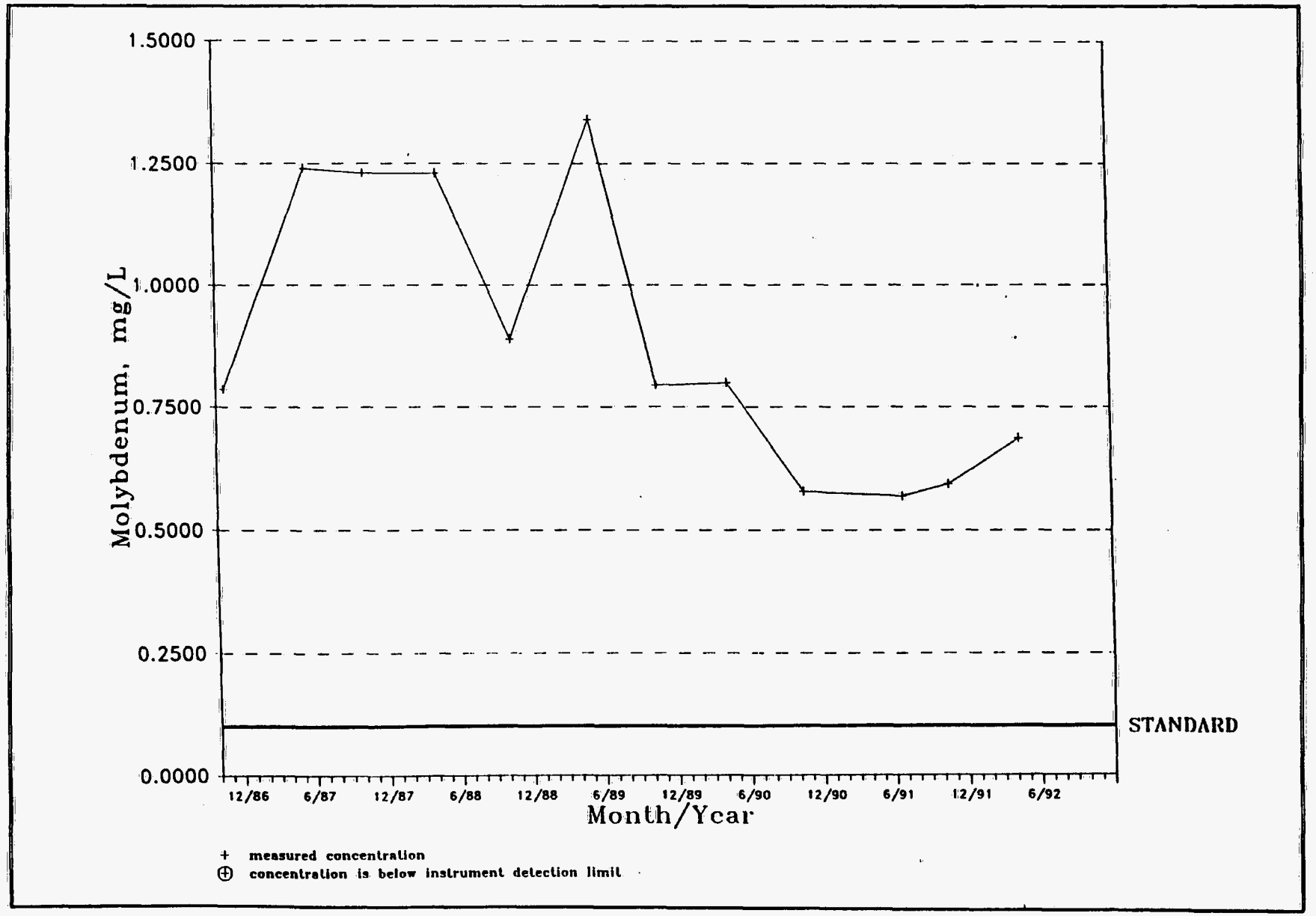

Figure B-18. Molybdenum Concentrations in Well 82-36A from October 1986 through April 1992

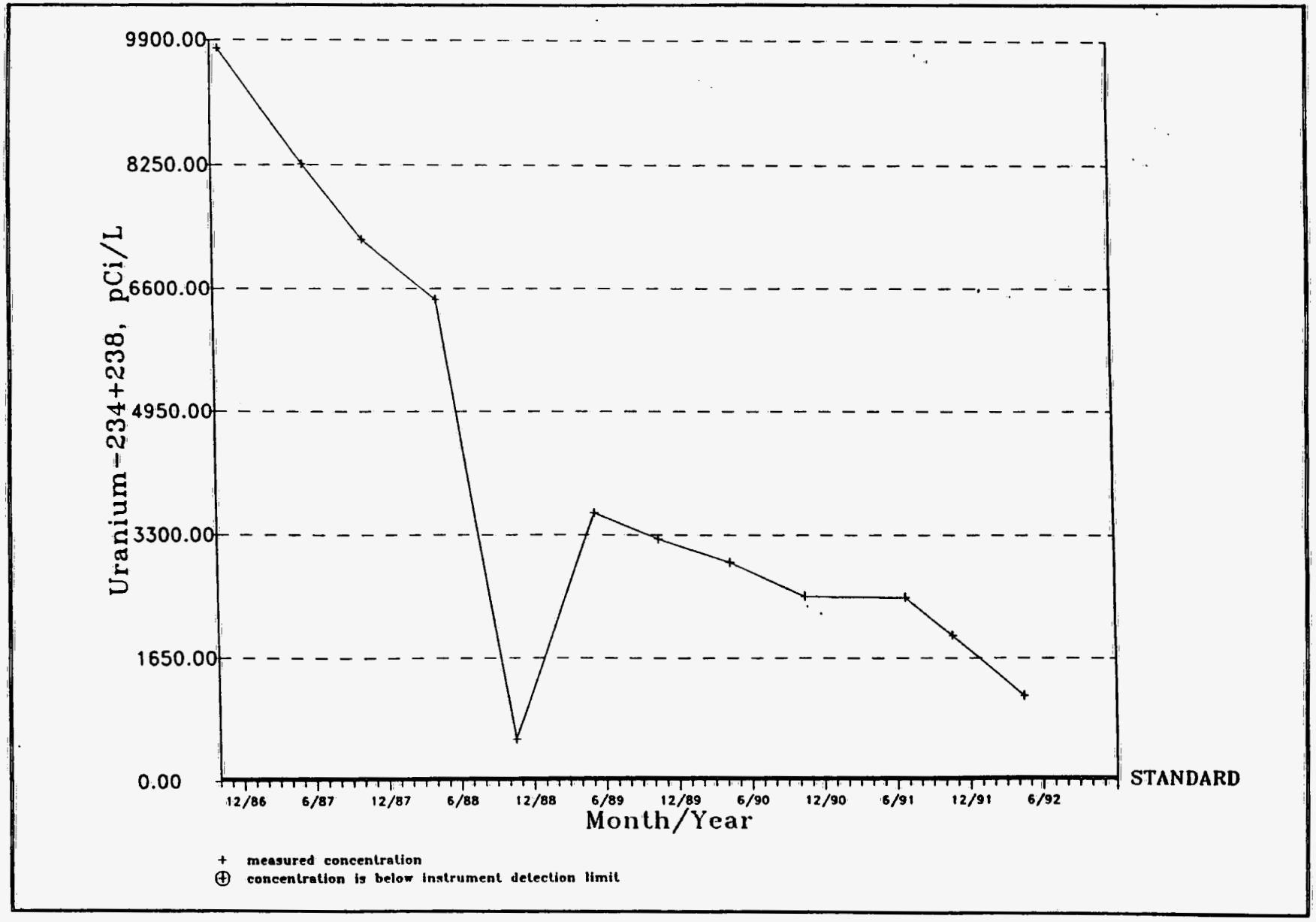

Figure B-19. Uranium-234+238 Concentrations in Well 82-36A from October 1986 through April 1992

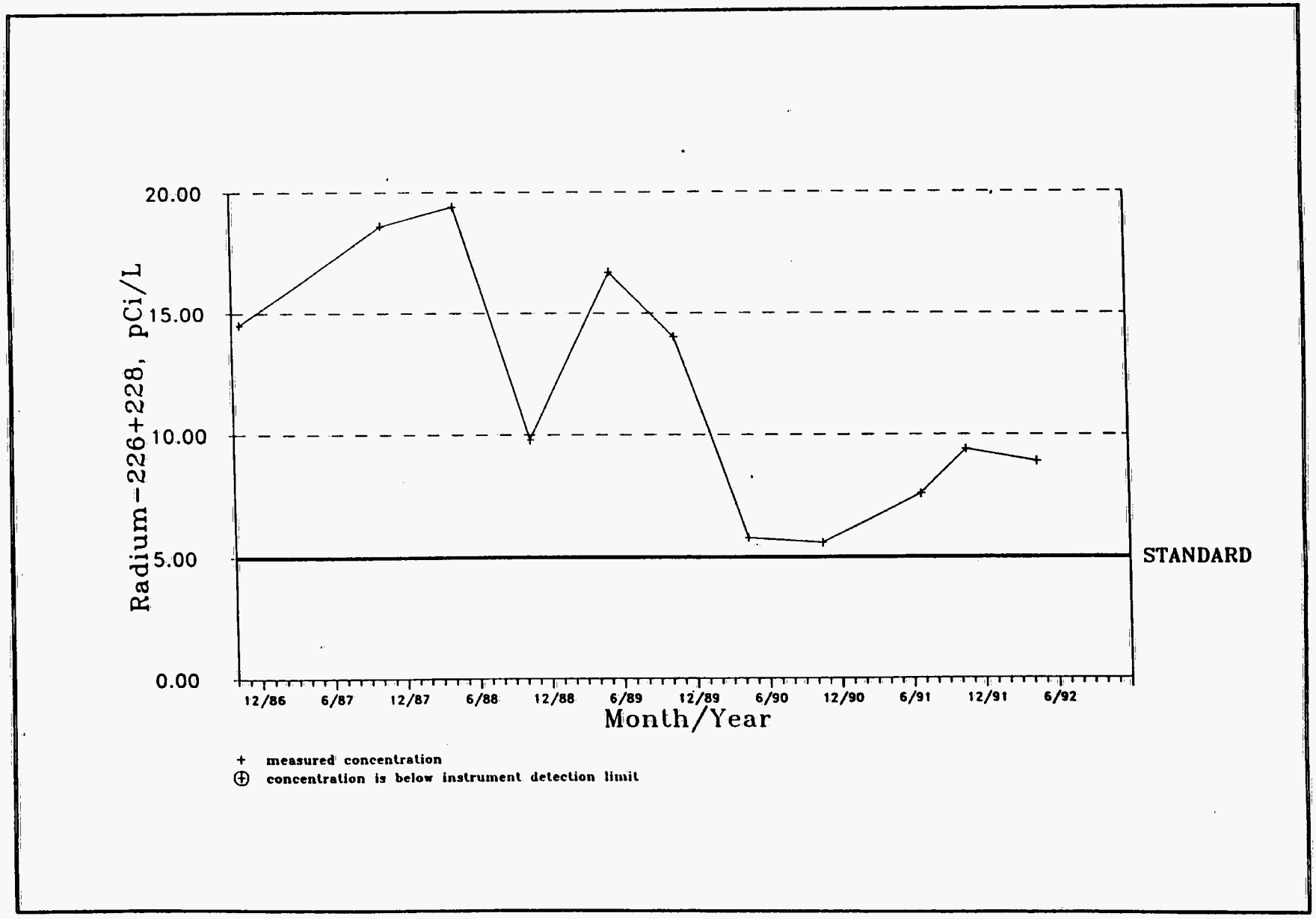

Figure B-20. Radium-226+228 Concentrations in Well 82-36A from October 1986 through April 1992

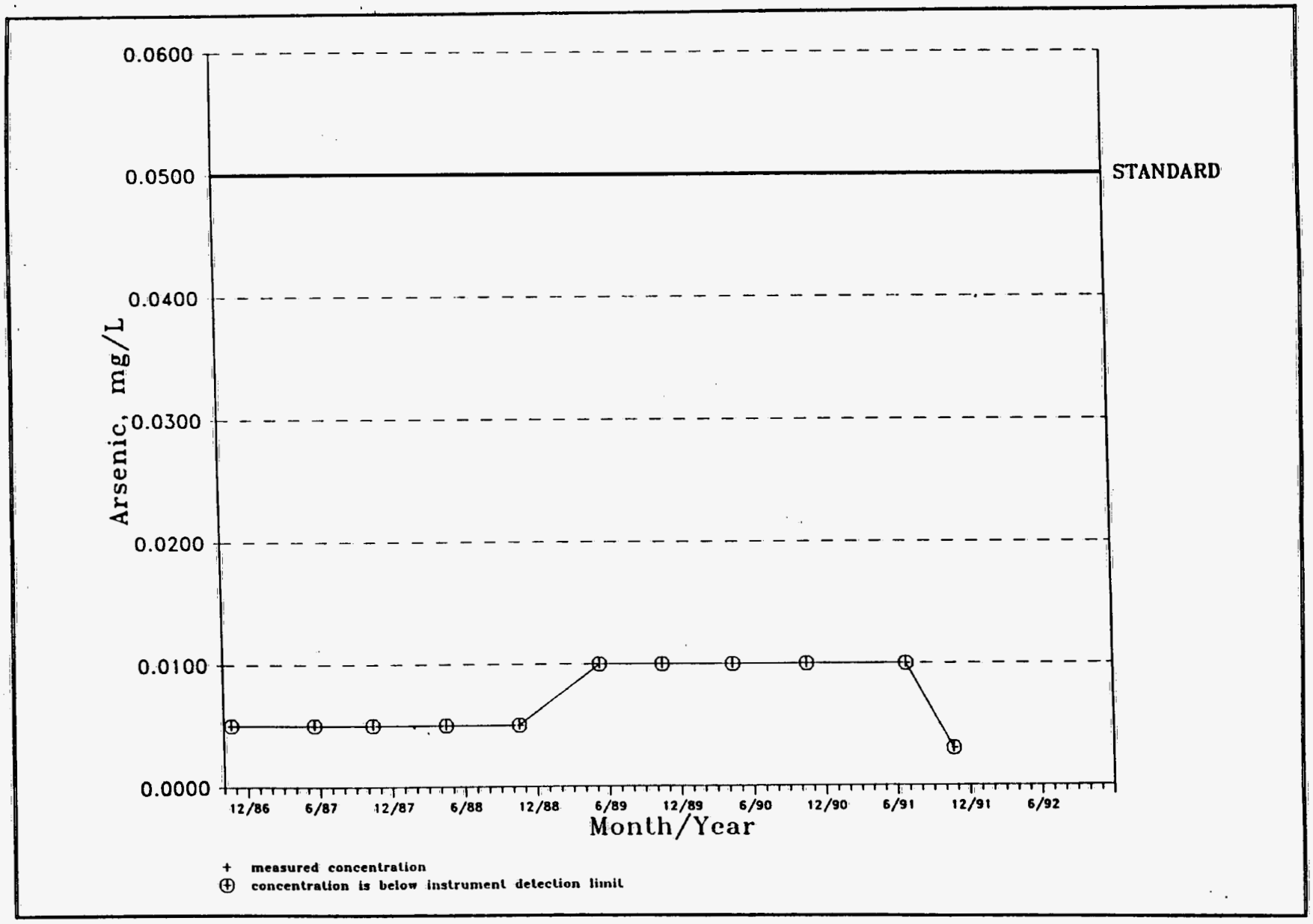

Figure B-21. Arsenic Concentrations in Well 82-08 from October 1986 through October 1991

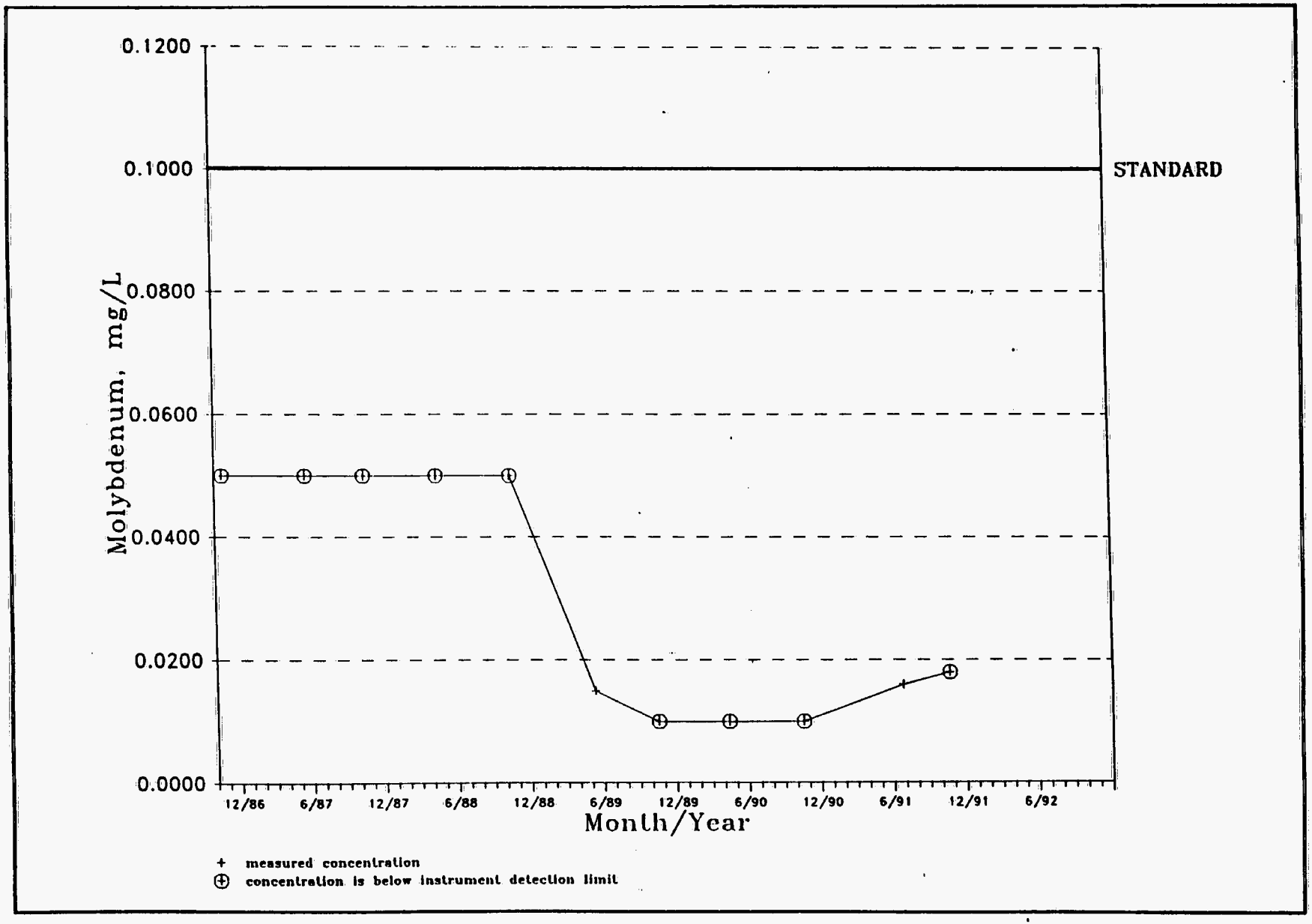

Figure B-22. Molybdenum Concentrations in Well 82-08 from October 1986 through October 1991

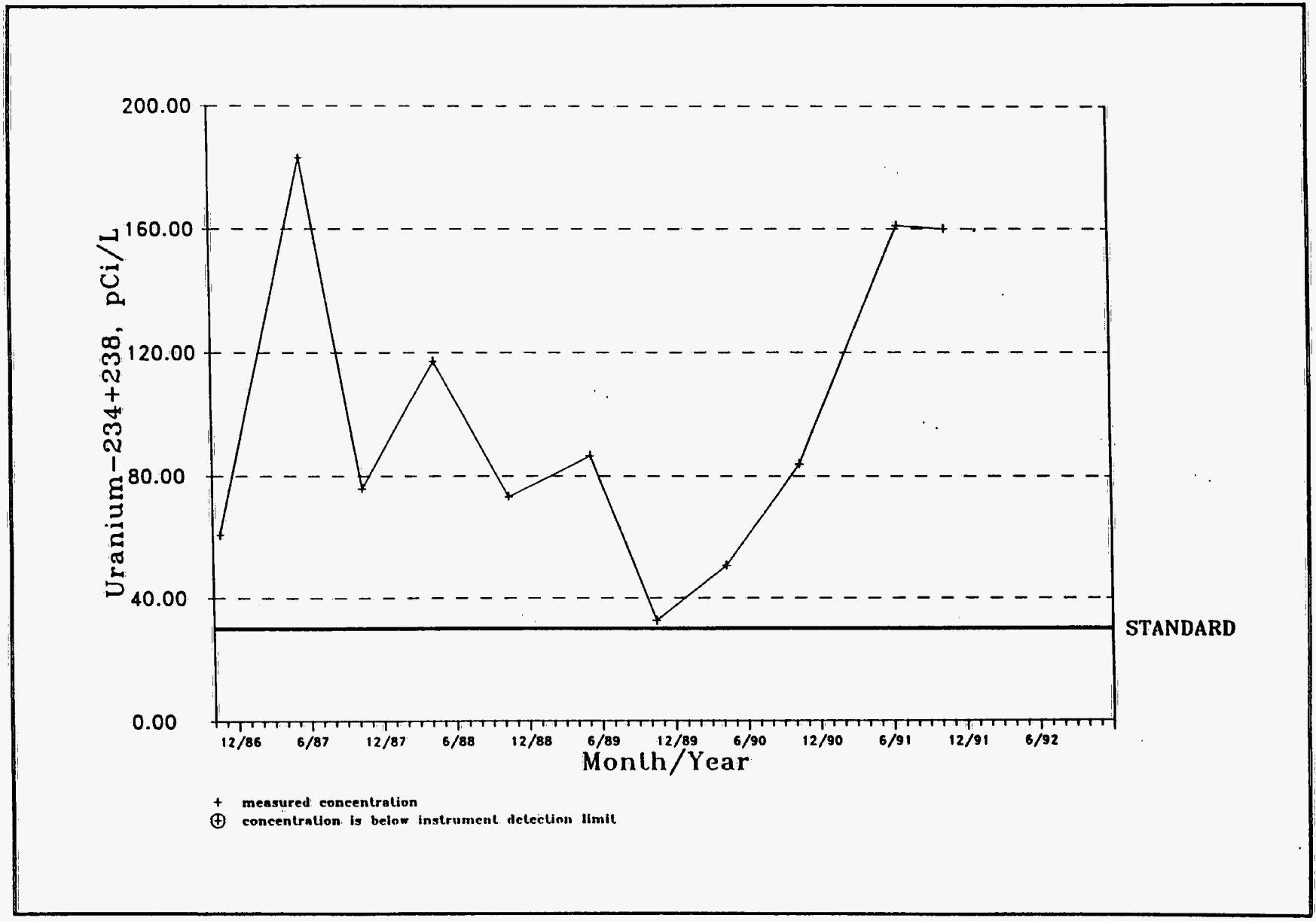

Figure B-23. Uranium-234+238 Concentrations in Well 82-08 from October 1986 through October 1991

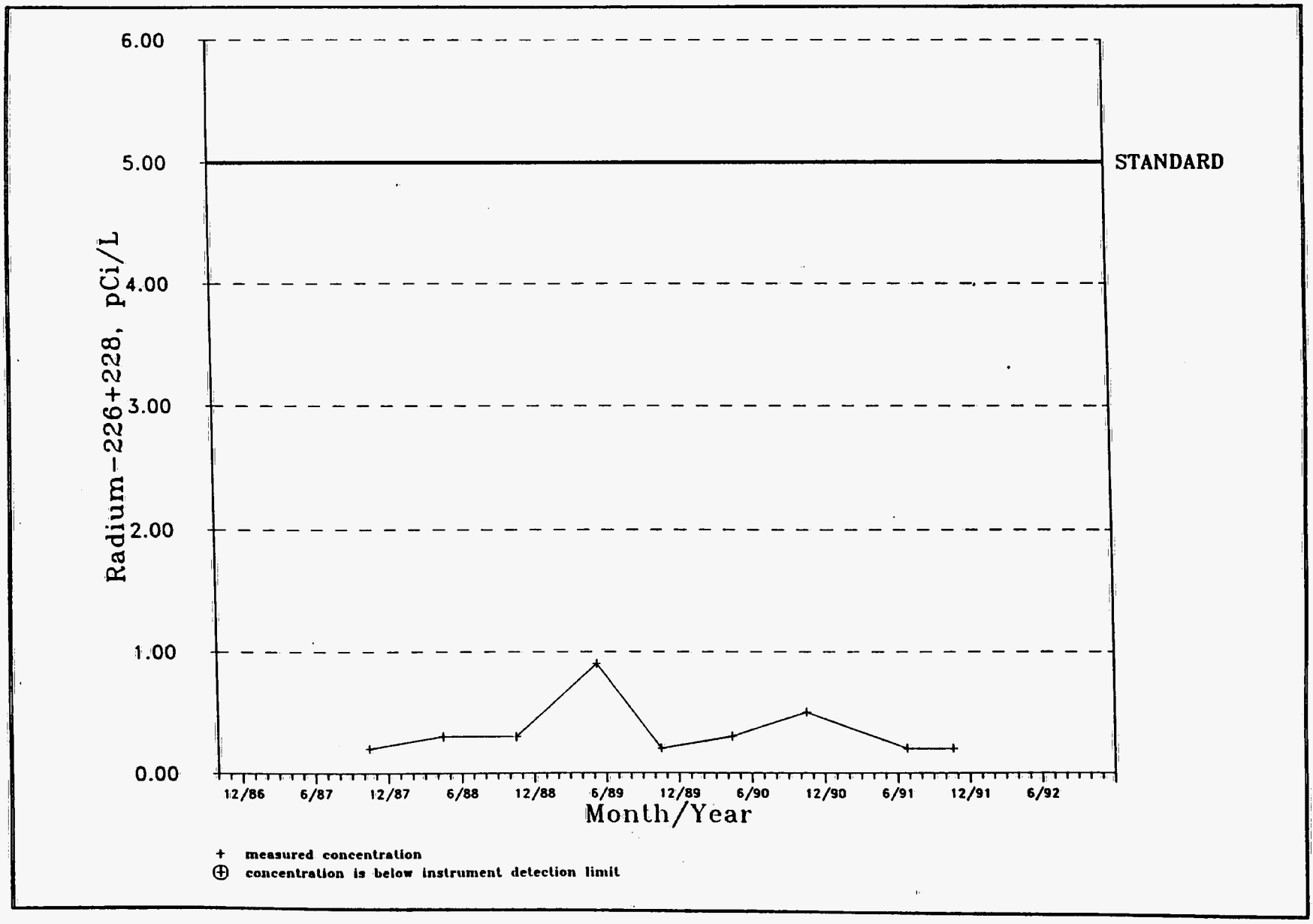

Figure B-24. Radium-226+228 Concentrations in Well 82-08 from October 1987 through October 1991